INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF

THE SECOND MEETING OF THE COMMON REGIONAL VPN TASK FORCE (CRV TF/2) OF APANPIRG

(Seoul, Republic of Korea
12 May 2014)

The views expressed in this Report should be taken as those of CRV TF/2 Meeting and not of the Organization. This Report will be provided for review by ACSICG/1 and CNS SG/18 for further action.

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1. Opening of the Meeting

1.1 The Second Meeting of the Common Regional Virtual Private Network (VPN) (CRV TF/2) of APANPIRG was held at the Hotel Riviera, Seoul, and Republic of Korea. The meeting was jointly hosted by Ministry of Land, Infrastructure and Transport (MOLIT), Republic of Korea, and Korea Airports Corporation (KAC).

1.2 On behalf of the host, Mr. Kim Kihyoun, Assistant Director, Air navigation Facilities Division of Office of Civil Aviation welcomed the participants. Mr. Chonlawit Banphawatthanarak highlighted the heavy work plan of the meeting. He also emphasized the objectives and process of the Task Force towards its report to be considered by ACSICG, CNS SG and APANPIRG. He further stated that some of the future meetings of this Task Force may not be opened for Industry as information of sealed tender would also be discussed.

1.3 Mr. Frederic Lecat, Regional Officer CNS, recalled the background of the project.

2. Attendance

2.1 The meeting was attended by 31 participants from Australia, Hong Kong China, Fiji, India, Japan, Malaysia, Nepal, New Zealand, Philippines, Singapore, Thailand and USA. The List of Participants is provided in **Attachment 1** to this Report.

3. Officers and Secretariat

3.1 Mr. Chonlawit Banphawatthanarak from Aerothai chaired the meeting.

3.2 Messrs. Frederic Lecat and Li Peng, Regional Officers CNS, ICAO Asia and Pacific Regional Office acted as secretaries for the meeting.

4. Organization, working arrangement, language and documentation

4.1 The CRV TF/2 met as a single body. The working language for the meeting was English inclusive of all documentation and this Report. The List of Working and Information Papers is provided in **Attachment 2** to this Report**.**

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Agenda Item 1: Adoption of Agenda

1.1 The tentative agenda presented through WP/1 was adopted by the meeting.

Agenda Item 2: Review draft documents: DOA, CRV CONOP, RFI

ConOps (WP/08)

2.1 The meeting reviewed the latest draft Concept of Operations presented by USA. The meeting suggested few amendments including addition of existing ATS messages exchanged via AMHS, MET information etc. The meeting also considered that the safety related requirements should be grouped under a chapter called "Safety preliminary analysis" and constitute the basis for further refinement by the different organizations in accordance with their safety management systems in place. Also the performance requirements should be grouped in another chapter and a review of global performance provisions (specifically from ACP WG) conducted, in addition to the performance requirements identified by the Task Force.

2.2 The meeting recognised that the CRV Concept of operations would be mature after the inclusion of the information on the OOG (CRV Operations Oversight Group) concept. OOG functions stem from the provisions drafted in the CONOP and DOA and are as follows:

- Implementation of APANPIRG Strategy
- Management of CRV membership
- Management of DOA document
- CRV rules and policies development and enforcement
- CRV disputes resolution
- CRV service provider contract management
- CRV shared cost allocation
- CRV change planning
- CRV service performance monitoring
- CRV network security monitoring
- Other CRV related activities

Discussion on concept of OOG (WP/03)

2.3 The meeting discussed the concept of Operations Oversight Group (OOG) to be established for the implementation stage. The meeting also discussed about the need for a 24/7 help desk service to be performed or not by OOG. The meeting was of the view that the 24/7 helpdesk from OOG would not be required for the initial period of CRV. The required service should be included in the service contract between individual ANSP and the selected communication service provider (CSP). The same should also be included in the RFI.

2.4 The meeting agreed that the relationship between members of OOG, users of CRV and CRV service provider should be specified in the DOA as provided in **Appendix A** to the Report.

2.5 The meeting also discussed about monitoring of performance requirement which was required to be conducted during CRV operations as per **Appendix D**.

2.6 Concerning 24/7 service, different scenarios were discussed: in the first scenario OOG is responsible for the 24/7 service monitoring, while the CRV service provider would be responsible for 24/7 service monitoring in full in the second scenario. Benefits and costs were discussed. In the scenario 1, starting the 24/7 OOG service monitoring would provide better service but with more complexity and at a higher cost than a 24/7 classic helpdesk by CRV service provider. Considering one of the main drawbacks for the scenario 2 was the potential poor knowledge in ATM fields, and therefore poorer support and poorer decision-making in escalation, the intermediate solution of a dedicated helpdesk in the 24/7 Network Operation Center in form of a dedicated Network Operation Center (NOC) appeared as being a good start. RFI could be used to sense the market on those options.

2.7 The meeting agreed to recommend the first model for OOG to ACSICG/1 meeting: the CRV service provider to provide a dedicated helpdesk NOC staffs should have a good knowledge of the CRV network and basic CNS/ATM skills. The NOC should be able to manage priority in their interventions (with a high priority granted for strongest impact on OPS/safety/security). During the contract execution, the OOG coordinator and relevant parties will monitor the effectiveness of the provided support by indicators and metrics. If the service is assessed as not satisfactory, then the OOG should be able to switch to provide 24/7 service monitoring. Therefore, the relevant documents, such as DOA and Sealed Tender, would have to enable both models and the switching to OOG Services monitoring if needed. Thus the costs of Dedicated helpdesk should be itemized in the contract, and reversibility of 24/7 support outsourcing ensured.

2.8 Following Actions Items were raised:

A2-4: CONOPS Task Leader to incorporate relevant information from Appendix D in the CONOPS and refer to OOG rules and policies document for OOG organisational matters (due date: 20 June 14).

A2-5: DOA Task Leader to enable both models of H24/7 support in DOA and refer to OOG rules and policies document for OOG organisational matters (due date: December 14).

A2-6: (Thailand, USA, January 2015): based on Appendix D, develop initial set of OOG rules and policies document

Draft DoA (WP/11)

2.9 The meeting reviewed the working draft of the CRV Multinational Document of Agreement (DoA) presented by Singapore. The DoA was proposed by CRV Task Force which was established by APANPIRG with a mandate to study a common IP network that can be shared by most APANPIRG members, providing for potentially simplified network acquisition at a reasonable operating cost.

2.10 DoA was first proposed in CRV TF/1 and Singapore was tasked to lead the drafting of the DoA. The DoA has since been drafted, revised, amended and updated during 3 separate teleconference meetings held respectively earlier this year. The current draft version (1.6) of the DoA placed at **Appendix A** was reviewed by the meeting. An initial contract period of 5 years with extension of 5 more years if the service is satisfactory was agreed, considering the addition of clause of termination with advanced notice of 6 months or 1 year.

2.11 The meeting considered difficult for the high level management of Organizations to commit to DoA Stage 2 provisions in 2014 as there are a number of uncertainties, including the cost of stage 2 operations (but not relating to the service contracts) that would have to be shared. Therefore the meeting agreed that the allocation of any additional costs in stage 2 shall be agreed by the parties in the future. The DoA provisions would concern Stage 2, while the stage 1 would be addressed through the MSA.

2.12 The meeting recognized and applauded the hard work accomplished by Singapore and the DoA task team in order to prepare the draft DoA.

Draft MSA (WP/07)

2.13 The APANPIRG CRV/TF-1 meeting held in Bangkok December 2013 decided to use the TCB services for selecting the single regional Communication Service Provider, for which TCB Services would be contracted through a Management Service Agreement (MSA). Introduced by WP/07, the MSA provided in **Appendix B** to the Report was drafted by ICAO Technical Cooperation Bureau in coordination with the ICAO APAC Regional Office.

2.14 It was proposed that after CRV TF/2 and ACSICG/1 meetings it be sent out along with the MSA to all States and Administrations by State letter, formally asking for comments before 27 June 2014. The consolidated version of draft MSA would then be submitted to the ICAO legal bureau, and the result of consultation be submitted to the CNS SG/18 meeting, if time allows, or to APANPIRG/25 else. A WP containing the Pioneer Parties would then be proposed to APANPIRG/25 through CNS SG/18 and would urge any State/Administration to join before 15 December 2014. The WP would make clear that any State not having joined before the effective date (15 December 2014) could not participate further in the procurement and associated meetings. The paper would also contain the milestones agreed by the meeting as follows: the cut-off date for Pioneer Parties to sign the MSA and transfer the deposit to ICAO TCB account are respectively 15 December 2014 and 31 January 2015, in order for TCB services to start in June 2015 at the latest. An Action Item was then included in the Actions table:

Action Item A2-7: MSA

That, the Secretariat to send out a letter to APAC States/Administrations inviting for comments on MSA before 27 June 2014.

2.15 The meeting recalled the following Draft Conclusion initially proposed by the CRV TF/1 meeting regarding adoption of DOA and CONOPS and adopted an additional Draft Conclusion:

Draft Conclusion 1/1 - CRV Document of Agreement (DOA) and Concept of Operation (CONOPS)

That,

*a) the Document of Agreement on the Common Regional VPN (DOA for CRV) for the APAC Region and the initial Concept of operation (CONOP) for the APAC CRV provided in **Appendix A** and **Appendix C** be adopted; and*

b) States be urged to endorse the draft DOA for CRV for the APAC Region and the initial Concept of Operation for the CRV.

Remark: Revise the Conclusion by ACSICG only for CONOPS and MSA draft while noting positive CBA result

Draft Conclusion 2/1 – CRV Pioneer Parties

That,

a) considering the list of States/Administrations (Australia, Fiji, Hong Kong China, India, Japan, New Zealand, Singapore, Thailand, and USA) that commit to be Pioneer Parties to sign the MSA;

b) considering the favorable Cost Benefit Analysis provided in **Appendix E** for CRV operations as a major enabler for GANP 4th Edition roadmap;

c) The Management Service Agreement provided in **Appendix B** be adopted;

d) All other States/Administrations be urged to become Pioneer Parties before 15 December 2014 or join for Stage 2; and

e) States/Administrations sign the MSA before 15 Dec. 2014 and transfer the necessary funds to ICAO TCB services before 31 January 2015;

RFI activities (WP/06)

2.16 The working paper was introduced by the Chair of the Task Force. It was recommended that the ConOps be part of the RFI to be issued in early August 2014. It would be published in ICAO APAC website and possible on CANSO website. The secretariat was requested to coordinate with CANSO for publishing RFI their website. The RFI should include also the list of physical locations as per ICAO survey (15 States).

2.17 The meeting discussed and agreed on the revised version of scope and structure of the Request For Information in **Appendix F** to the Report and discussed the opportunity that CRVTF/3 meeting scheduled for December 2014 could arrange a dedicated session of 1 day for questions/replies with interested CSP.

2.18 Considering that a GO/NO GO for the Sealed Tender Process would be sought from APANPIRG/25 in September 2014, and that consequently the RFI would be a non-binding process, the meeting agreed on the following draft decision:

Action Item A2-8: CRV RFI

A Request for Information (RFI) for CRV be prepared and published on ICAO APAC website States/before August 2014 advertising the CRV project and requesting technical and commercial information to the Telecommunication Service Providers.

CRV User requirements

2.19 The CRV User Requirements Template and associated guidance (“how to”) to be used by CRV Project for gathering the user requirements of the CRV Sealed Tender were introduced by WP/02, along with considerations about the user requirements process. It was recognized indeed that the final set of requirements would constitute the basis of the future CRV contract, along with the Best and Final Offer

of the winner. The more accurate the requirements, the more efficient the procurement process would be as it would ascertain:

- A correct understanding of the requirements by the bidders and accuracy/completeness of the proposals;
- An evaluation of the different proposals and assessment of the compliance by the CRV Selection Committee, and selection of the winner; and
- The efficient and fair execution by the Parties of the said contract.

2.20 Following a system engineering process, the elaboration of CRV user requirements should be based on the CONOPS, including the use cases developed. The CONOPS calls for a safety case since operational data will be carried upon the CRV network, the failure of which will have safety impacts. Some useful information is also available in the Cost Benefit Analysis/ICAO Survey (history of failures, problems currently experienced and expected by APAC States, actual reliability of the communications, list of sites with physical locations, etc).Some information will also come from the RFI process. CRV TF/1 also benchmarked some other regional networks (PENS, MEVA etc), and some valuable information may be retrieved from the associated documentation.

2.21 The meeting adopted the User Requirements "How To" and template placed respectively at **Appendix J** and **Appendix K** to generate the CRV User Requirements.

2.22 The CRV planning should reflect the breakdown of the User Requirements Process into subtasks discussed here above. Furthermore it was felt necessary to start the Task to generate requirements much sooner than what was planned by CRVTFProject_rev05 in order to be able to perform the safety case and mature the requirements. Dependencies for this task are CONOPS and RFI. Draft version of CONOPS would be available for CRV TF/2 meeting, hence the make user requirements task can start on 20/05/14. There is a clear advantage to keep running the User requirements generation in parallel with CONOPS updates and RFI. As a result, the planning was updated as follows and is provided as **Appendix G** to the Report.

CRV Task	Task Name	Start	Finish
37	**Generate Requirements**	**Tue 4/1/14**	**Fri 4/17/15**
37-a	Make User Requirement Template	Tue 4/1/14	Mon 4/28/14
37-b	Make Preliminary Safety preliminary analysis	Tue 4/29/14	Mon 12/8/14
37-c	Make user Requirements	Tue 5/20/14	Fri 4/17/15

2.23 The meeting agreed that the CRV Task 37b Make preliminary Safety preliminary analysis would be led by Frederic Lecat with contributors Hong Kong China, Singapore, India and Australia. Task 37-c would be led by Mr. Chonlawit Banphawatthanarak with contributors Thailand, Malaysia, USA, Singapore , Fiji and Philippines and Japan to review the information prepared by a teleconference. The new users' requirement will be distributed to each participants.

Other Stakeholders using CRV (WP/09)

2.24 India presented a working paper discussing the participation of new stakeholders in CRV such as airports, air operators in the future in the framework of SWIM. The issue was considered relevant but have to be addressed at a later stage. The meeting requested the Secretariat to seek experience and practice from PENS project. The solution for CRV would have to be further discussed in the future and introduced in DOA and CONOPS.

Action Item A2-9: (September 2014) : Secretariat to seek experience and policies of PENS as to how to include additional network users in the network.

Action ItemA2-10: (September 2015) : to update DOA and CONOPS regarding the inclusion of additional network users in CRV such as airports, air operators etc.

Agenda Item 3: Review Cost benefit analyses (first iteration) result

Cost Benefit Analysis (WP/04)

3.1 On behalf of India, Australia and the Secretariat, Japan introduced the Cost Benefit Analysis (CBA) to implement the Common Regional Virtual Private Network (CRV) in Asia/Pacific Region based on the ICAO survey 'Data collection for Cost-benefit Analysis of the CRV network' (AP170-13-CNS, 18th Dec. 2013). As per 12 May 2014, 15 States had replied to the survey.

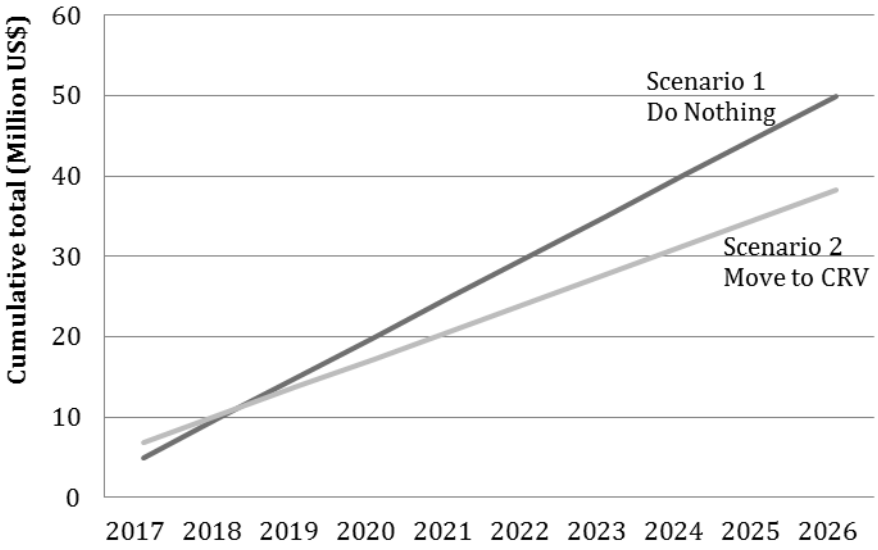
3.2 The CBA studied two scenarios: not introducing (status quo) or introducing a common aeronautical regional network in the Asia/Pacific region. Cost and benefit analysis was performed for the two scenarios.

3.3 The summary of costs and benefits was discussed:

	Scenario 1 – Do Nothing (based on ICAO survey)	Scenario 2 – Move to CRV
Quantitative benefit		
Costs	Scenario of reference Costs increase induced by greater connectivity is exponential	• Expected reduction of the total cost of ownership by 23% over 10 years for 15 States (same number as for Scenario of reference) • Initial one-off deployment efforts paid back in one to two years • Costs increase induced by greater connectivity is linear

	Scenario 1 – Do Nothing (based on ICAO survey)	Scenario 2 – Move to CRV
Performance	Lower performance due to low speed/obsolescent technology and unsuitable design	Better performance based on performance and safety monitoring, and ad hoc design including high speed technology (1~2 Mbps connectivity)
Diversity	Fallback solutions by Operator when available	Solutions available on the market (logical fallback on IP-VPN and physical diversity etc) but shall be required through user requirements and monitored
Reactivity (Delays)	• Longer period to implement a new line with poor control of delays (a couple of months) • Poor synchronization change management between APAC States	Reduced time to coordinate and implement any upgrade following pre-established and homogeneous contractual requirements (a couple of weeks)
Qualitative benefit		
Safety	Lay down by Point to point, secured by physical	Ensured through network design
International commitment	Not possible to meet ICAO GANP objectives	Possible to meet ICAO GANP objectives
Contingency	Manage with coordinating each half-circuit by both Service Providers	Manage a whole network by Service Provider
Upgradeability	Need for new line and facility to upgrade Bandwidth	Easy to upgrade Bandwidth without installing additional facility

3.4 To compare the cost of the two scenarios on a fair basis, the cost of moving to the CRV was estimated over the CRV lifecycle, 10 years (initial 5 years contract plus 5 years extension), including the initial one-off deployment costs to implement the CRV network. Both scenarios were extrapolated for the same number of States, 15. For the scenario 1, actual costs as per ICAO survey (USD5 million per year for 15 States) were simply extrapolated: the assumption was made here that the current IPL network serving in APAC would not need to be further meshed. In the scenario 2, one-off costs (15 States) were assessed and yearly service costs extrapolated. The cumulative total cost over 10 years (2017-2026) was found to be largely in favour of scenario 2, Move to CRV.



3.5 This shows that the distance between the 2 scenarios as regards the total cost of ownership was estimated in a conservative way. Costs increase induced by greater connectivity is exponential in Scenario 1 and linear in Scenario 2. Any new need of connectivity would favour even more the scenario 2.

3.6 In view of the foregoing, the meeting formulated the following Draft Conclusion:

Draft Conclusion 2/2 - CRV Cost Benefit analysis

That, the first iteration of the CRV Cost Benefit analysis, as provided in **Appendix E** to this Report be adopted and distributed to States/Administration for their reference.

3.7 The meeting also encouraged other Administrations that having not done so to provide required information to the ICAO Region Office as soon as possible.

3.8 Nevertheless it is not expected that further updates to the survey would change dramatically the assessment that the Scenario 2 is definitively more cost efficient and operationally for the States in the APAC Region, considering the expected traffic growth in the coming years.

3.9 It was discussed that the cost allocation scheme for stage 1 could take into account the difference between Backbone BIS States and BIS States which would facilitate the buy-in from smaller States in the procurement stage 1.

3.10 It was also agreed to develop a simple cost benefit analysis to join stage 1 and not passively wait for stage 2. Some material was already developed that should be reviewed and presented to CSN SG and APANPIRG.

Agenda Item 4: Review CRV Project Gantt chart

Future plan and milestone of CRV Task Force work (WP/05)

4.1 The meeting reviewed and noted the outstanding tasks of the CRV Task Force and proposed actions and their timeframe for each elements or sub-task as shown in the **Appendix G** to this Report.

4.2 Rev 06 should be updated to reflect the outcome of the meeting regarding DOA, MSA and deadline for transfer of funds to TCB.

Agenda Item 5: Discuss CRV Work Programme for next period (May 14 – Oct. 14) and Action Items

5.1 The meeting futher reviewed CRV Task Force activities since CRV TF/1 meeting and for the next period (May 14 – October 14) as shown below:

Previous period (since CRV TF/1)

5.2 Following tasks were active in the period since CRV/TF-1 in December 2013:

- Draft CONOP
- Draft DoA
- Funding Cost Assessment
- Data Collection (Including State Letter)
- Draft CBA for ACSICG/1
- Draft RFI
- Make User Requirement Template

Meetings

5.3 A number of meetings took place, with a steady participation and stability in participants:

Meeting	Date	Participants
CRV TF - Progress meeting #1 (teleconference)	15 Jan. 2014	16
CRV Task Force - Task CONOPS: Meeting on draft CONOPS	18 Feb. 2014	5
CRV Task Force - Task DoA: Meeting on draft DOA	07 March 2014	20
CRV progress meeting #2	12 March 2014	19
CRV Task Force - Task CONOPS: Meeting on draft CONOPS#2	02 April 2014	19
CRV Task Force - Task DoA: Meeting on draft DOA #2	08 April 2014	17
Asia Pacific Common Regional VPN: meeting on procurement (CRV Chairman/ICAO/ICAO TCB)	09 April 2014	4
CRV Task Force - Task DoA: Meeting on draft DOA #3	29 April 2014	17

Deliveries

5.4 Deliveries were done as planned, or are on track with the planning:

CRV Task	Task Name	Planned Delivery	Actual delivery
11	Draft CONOP	Fri 3/14/14	0.1 March 1, 2014 0.2 March 28, 2014 0.3 April 02, 2014 0.4 April 30, 2014
16	Draft DoA	Fri 1/17/14	V1.0 December 2013 V1.1 28 Feb 2014 V1.2 06 Mar 2014 V1.3 28 Mar 2014 V 1.4 08 Apr 2014 V 1.5 11 Apr 2014
17	Funding Cost Assessment	Fri 5/9/14	In progress Good confidence
25	Data Collection (Including State Letter)	Fri 2/14/14	05 March 2014 (13 States) 06 March 14 (14 States) 11 April 2014 (15 States)
26	Draft CBA for ACSICG/1	Fri 4/25/14	30 April 2014
30	Draft RFI	Fri 7/11/14	In progress
37-a	Make User Requirement Template	Mon 4/28/14	02 April 2014
38	Determine Selection Process	Tue 7/7/15	07 March 2014 (Meeting on draft DOA)

Actions and risks

5.5 Actions and risks table attached to WP/05 was reviewed by the meeting. The meeting noted that a new risk R2 was raised during the meeting CRV Task Force - Task DoA: Meeting on draft DOA #3 dated 29 April 2014. A mitigation strategy has to be discussed, documented and implemented.

5.6 A new hazard (R3) was also considered by the meeting: Too low number of Parties joining to fund the TCB procurement process. Effect and mitigation strategy were elaborated consequently.

5.7 The resulting table follows and is also placed at **Appendix H** to this Report:

	Raised	Probability	Severity	Hazard	Impact	Mitigation	Comment
R1	15/01/14	Unlikely	Severe	Draft MSA not endorsed by APANPIRG/25	Major delay generated for final delivery of CRV implementation (1 year).	R1-1	
R2	29/04/14	Remote	Severe	Some parties having signed the MSA but not able to pay their share	Major delay generated for final delivery of CRV implementation (1 year).	No mitigation: it is accepted that TCB would not start the work at the expected date	Accept the delay as States would not cover the missing share(s)
R3	05/12/14	Remote	Severe	Too low number of Parties joining to fund the TCB procurement process	Project abandoned or major delay generated for final delivery of CRV implementation (1 year).(Procurement cannot be done with TCB support)	Way forward through Draft Conclusion/WP to APANPIRG/25	

General progress

5.8 The meeting reviewed the progress report as placed in **Appendix I** and noted with appreciation the general progress of the CRV project.

Next period (May 14 – October 14)

5.9 The meeting reviewed the work plan for the next period and allocated task leader and contributors for new tasks:

CRV Task	Task Name	Start	Finish	Task leader	Task contributors
12	Update CONOP from ACSICG/1	Mon 5/19/14	Thu 7/10/14	USA	Australia, India, Singapore,Thailand
13	Update CONOP from CNS/18	Mon 7/21/14	Mon 8/11/14	USA	Australia, India, Singapore,Thailand
14	Refine CONOP after APANPIRG	Mon 9/15/14	Fri 10/24/14	USA	Australia, India, Singapore,Thailand
17	Funding Cost Assessment	Mon 1/20/14	Fri 5/9/14	ICAO TCB	ICAO RO

CRV Task	Task Name	Start	Finish	Task leader	Task contributors
18	Update MSA/DOA from ACSICG/1	Mon 5/19/14	Thu 7/10/14	Singapore	Australia, Fiji, China, Hong Kong China, India, Japan, New Zealand, Thailand,USA, ICAO TCB
19	Update MSA/DOA from CNS/18	Mon 7/21/14	Tue 8/12/14	Singapore	(idem)
20	Finalize MSA for Signature	Mon 9/15/14	Fri 10/24/14	Singapore	(idem)
21	Sign MSA	Mon 10/27/14	Fri 6/5/15	All committing to join	ICAO TCB
27	Data Collection All states	Mon 4/28/14	Wed 12/31/14	ICAO RO	All States not having contributed yet
28	Update CBA for ACSICG/2 from RFI	Mon 2/16/15	Thu 4/30/15	Japan (TBC)	Australia, India, ICAO RO
30	Draft RFI	Mon 3/17/14	Fri 7/11/14	USA	Australia (TBC), Singapore, Thailand, ICAO RO
31	Release of RFI	Mon 7/14/14	Fri 8/1/14	USA	Australia (TBC), Singapore, Thailand, ICAO RO
32	Waiting Response	Mon 8/4/14	Fri 10/24/14		Australia (TBC), Singapore, Thailand, ICAO RO
33	RFI Close	Fri 10/24/14	Fri 10/24/14	USA	Australia (TBC), Singapore, Thailand, ICAO RO
34	Review and Process RFI	Mon 10/27/14	Fri 2/13/15	USA	Australia (TBC), Singapore, Thailand, ICAO RO
37-b	Make Preliminary Safety Analysis	Tue 4/29/14	Mon 12/8/14	ICAO RO	Australia, Hong Kong China, India Singapore, Thailand
37-c	Make user Requirements	Tue 5/20/14	Fri 4/17/15	Thailand	Fiji Japan Malaysia Philippines Singapore, USA, ICAO RO

5.10 The meeting urged the participants not having an account yet to request it and use the CRV portal (https://portal.icao.int/CRV/Pages/default.aspx) as main source and destination of documentation for CRV projects, for the benefit of all CRV participants.

5.11 The meeting recommend to ACSICG meeting to maximise the participation in CRV project and welcome new Members.

Agenda Item 6: Any other business

6.1 The meeting reviewed a draft communication on the CRV project towards CANSO placed at **Appendix L** to the Report.

Action Item A2-11: ICAO to coordinate the communication on CRV with CANSO and States/Administrations (due date: 30 May 14) and possibly provide a link to the RFI on the ICAO APAC RO website.

6.2 Indian presented its plans for introducing IP-VPN ground/ground communication network using commercially available MPLS network. Introduction was planned to be likely in phase with CRV implementation.

Future meetings

6.3 The meeting planned future teleconferences/meetings as follows:

Meeting	Date
CRV Task Force – MSA	28 May 14
CRV Task Force - draft CONOPS#3	04 June 14
CRV Task Force - RFI #2 and MSA	25 June 14
CRV progress meeting #3 and preparation of CNS SG/18	09 July 14
CRV Task Force - Users requirements #1	13 August 14
CRV Task Force – CRV progress meeting #4 and preparation of APANPIRG#25	03 September 14
CRV Task Force – Users requirements #2	07 October 14
CRV TF/3 (including first day meeting for questions/replies for RFI with interested CSP if confirmed)	15-17 December 14 (Bangkok)
Procurement ad hoc meeting for Pioneer Parties	March 2015 (Bangkok)
CRV TF/4 (back to back with ACSICG/2)	May 2015

Note of appreciation

6.4 The meeting expressed its appreciation and gratitude to the MOLIT and KAC for hosting the meeting, for the excellent arrangements made, the warm hospitality and all activities organized during the meeting.

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INTERNATIONAL CIVIL AVIATION ORGANIZATION

DOCUMENT OF AGREEMENT (DOA) ON THE JOINT PARTICIPATION, ACQUISITION AND ADMINISTRATION OF A COMMON REGIONAL VIRTUAL PRIVATE NETWORK (CRV) FOR AERONAUTICAL TELECOMMUNICATIONS SERVICES

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA-PACIFIC OFFICE

Revision History

Version	Date	Description
V1.0		Initial draft issued by CRV TF
V1.1	28 Feb 2014	Amendment of draft version of the Document of Agreement (DOA) – by Singapore
V1.2	06 Mar 2014	Amendments by ICAO
V1.3	28 Mar 2014	Amendments by Singapore
V 1.4	08 Apr 2014	Amendments by ICAO
V 1.5	11 Apr 2014	Amendments by Singapore
V 1.6	12 May 2014	Amendments by Singapore

Note: When the final accepted version is ready, it will be marked as V1.0 released and the above history would be deleted.

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ANNEXES

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PREAMBLE

WHEREAS the PARTIES (individually "Party") having determined that the establishment of a Common Regional Virtual Private Network (CRV) multinational service with a common service provider can more effectively:

(a) provide network services to the Parties;
(b) support a common Internet Protocol (IP) network;
(c) establish services based on Voice over IP (VoIP); and
(d) enhance network diversity and timely service implementation and delivery.

HEREBY agree as follows:

ARTICLE I DEFINITIONS

1.1 For the purpose of this Document of Agreement, unless the context otherwise requires, the following definitions shall apply:

"**Agreement**" means the Document of Agreement (DOA) on the Joint Participation, Acquisition and Administration of a Common Regional Virtual Private Network (CRV) for Aeronautical Telecommunications Services;

"**Aeronautical Telecommunication Services**" means telecommunication services provided for any aeronautical purposes;

"**Air Traffic Service Message Handling System (AMHS)**" means the system that is used to exchange Air Traffic Service (ATS) messages between users over the Aeronautical Telecommunication Network (ATN);

"**Aeronautical Telecommunication Network (ATN)**" means network that comprises application entities and communication services which allow ground, air-to-ground and avionics data subnetworks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) open systems interconnection (OSI) reference model;

"**Air Navigation Service Provider (ANSP)**" means an organization that provides services to air traffic during all phases of operations to ensure their safe and efficient movement and may be a government

department, state-owned company, statutory body or private company;

"**ACSICG**" means the Aeronautical Communications Services Implementation Coordination Group of APANPIRG;

"**APAC**" means Asia/Pacific.

"**APANPIRG**" means the Asia Pacific Air Navigation Planning and Implementation Regional Group;

"**CNS SG**" means the Communications/Navigation/Surveillance Sub-Group of APANPIRG;

"**CRV**" or "Network" means the Common Regional Virtual Private Network (VPN) which is a multinational service to be provided by a Service Provider to provide common IP based network Services across the APAC Region to support existing aeronautical telecommunication services or new requirements that are emerging from future Air Traffic Management (ATM) concepts;

"**CRV Coordinator**" means the chairperson of the CRV Task Force;

"**CRV Task Force**" means the group of Subject Matter Experts (SMEs) established by APANPIRG. ;

"**Effective Date**" means the date of coming into force of this Agreement as specified in Article 2.3;

"**Framework Agreement**" means an agreement between the Pioneer Parties and the Service Provider under which the Service Provider shall set up the CRV and provide CRV services to each Party on the common terms and conditions as set out in the Framework Agreement;.

"**ICAO**" means the International Civil Aviation Organization;

"**IP**" means Internet Protocol. It is the common protocol proposed to be used for the CRV network;

"**Network Services**" or "Services" means the network services, applications and/or any other related services required for establishing, operating and maintaining the CRV network, including but not limited to network monitoring, filtering and/or scanning;

"**OOG**" means the Operational Oversight Group of the CRV network;

"**OOG Chairman**" means the chairperson of the OOG;

"**Parties**" (individually "Party") means an ICAO Contracting State or any other entity which are signatories to this Agreement, either by or after the Effective Date;

"**Management Services Agreement (MSA)**" means the service agreement between the Parties and TCB;

"**Procurement Management**" means the management of CRV procurement services or any other related services rendered by TCB for the Parties in the procurement process, up to the award of the Framework Agreement;

"**Request for Information (RFI)**" means the process to gather information from potential contractors/service providers for the preparation of the Sealed Tender;

"**Sealed Tender**" means the process to request for potential contractors/service providers to bid and provide the Services;

"**Service Contract**" means the contractual agreement between a Party and the Service Provider for the provision of CRV Services;

"**Service Provider**" means the contractor that is awarded the contract to provide the CRV Services to each Party;

"**TCB**" means the Technical Cooperation Bureau of ICAO which will be appointed to perform the procurement of the Services.

1.2 Words importing the singular include the plural and vice versa.

1.3 The headings are for convenience only and not for the purpose of interpretation.

ARTICLE II GENERAL

2.1 The purpose of this Agreement is to define the terms, on which the Parties have agreed to undertake for the establishment of a CRV.

2.2 Only the ICAO Contracting States, and other entities listed at **Annex A** can be a Party to this Agreement.

2.3 This Agreement shall come into force on [ ] for those Parties that are Pioneer Parties and which have, by that date, signed the Agreement.

2.4 Any other ICAO Contracting State or entity listed at Annex A, and which is not a Party to this Agreement as at [ ] may become a Party to this Agreement at any time on or after the commencement of Stage 2 of the Agreement and the Agreement shall enter into force for that Party on the date of the signing of this Agreement.

2.5 For the purpose of establishing the CRV, the activities to be undertaken shall be carried out in two (2) stages and include the following:

Stage	Description	General Activities	Dates
One (1)	Procurement Management	1. Signing of MSA by Pioneer Parties with ICAO (TCB) for management of procurement of CRV 2. Invitation, Evaluation and recommendation of Award by ICAO (TCB); 3. Award of Framework Agreement by Pioneer Parties	Start: The Effective Date. End: [Award and signing of the FA.]
Stage	**Description**	**General Activities**	**Dates**
Two (2)	Implementation and Operation Management	1. Setting up CRV by the Service Provider; 2. Finalisation and Executing of Service Contract between Service Provider and Parties; 2. Oversight of CRV Operations and Maintenance by the OOG;	Start: [Day after signing of FA] End: [10 years, based on 5 + 5 years option to extend]

ARTICLE III STAGE 1 AND 2 ACTIVITIES

Stage 1

6.1 Stage 1 shall commence on [the Effective Date] and shall end on [the date of the award of the Framework Agreement].

6.2 Appointment of Technical Cooperation Bureau of ICAO (TCB) for Procurement Management:

(a) All Pioneer Parties jointly agree on the terms set out in **Annex B** to appoint TCB to undertake the procurement management of the CRV and to award the Framework Agreement to the Service Provider. The agreed MSA to be signed between the Pioneer Parties and TCB is attached in **Annex B-2.**

(b) All Pioneer Parties jointly agree to prepare RFI documents, finalise tender specifications and evaluate tender responses.

Stage 2

6.3 Stage 2 shall commence on the day following the date of the award of the Framework Agreement.

6.4 Implementation and Operation Management

(a) All Parties jointly agree that the implementation and operation stage shall be managed by the OOG.

(b) The details of the OOG, including its roles and operating process are set out in **Annex C**.

ARTICLE IV PARTICIPANTS

3.1 There shall be two (2) categories of participants to this Agreement as follows:

(a) Pioneer Parties
Pioneer Parties (individually called Pioneer Party) are the ICAO Contracting States and other entities that have become signatories to this Agreement by the Effective Date and will implement Stage 1 of

this Agreement.

Pioneer Parties shall contribute to the fee payable to TCB according to **Annex B**. The Pioneer Parties will be invited to be part of the Tender Evaluation Committee (TEC) and make the award of the Sealed Tender.

(b) Ordinary Parties

Ordinary Parties (individually called Ordinary Party) refer to the ICAO Contracting States and other entities that become signatories to this Agreement on or after the commencement of Stage 2 of the Agreement.

Ordinary Parties will be required to sign the Service Contract with the Service Provider within 45 days of becoming a signatory to this Agreement.

(a) Procedures for Membership: The procedures for membership application are as follows:

(i) All eligible States, Administrations and Organisations may apply for membership in writing to the CRV Coordinator and sign the Agreement before the Effective Date and abide by the conditions set forth therein to be Pioneer Parties.

(ii) Applications after the Effective Date shall be made in writing to the OOG Chairman during Stage 2 and sign the Agreement and abide by the conditions set forth therein to be Ordinary Parties.

3.2 Withdrawal from the Agreement

(a) Any Party may withdraw from the Agreement in accordance with the following procedures:

i. A Party that desires to withdraw from this Agreement ("the withdrawing Party")shall give not less than 90 days' advanced notice (from the date of withdrawal) in writing to the CRV Coordinator (during Stage 1) or OOG Chairman (during Stage 2). Upon receipt of such withdrawal notice, the CRV Coordinator or OOG Chairman, as the case may be, shall advise the remaining Parties in writing as soon as practicable of the withdrawal and any expected change in the performance of the Services and the

financial effect of such withdrawal.

ii. Notwithstanding a Party's withdrawal from this Agreement, no provision of this Agreement shall be construed to relieve the withdrawing Party of its obligations under the terms and conditions of this Agreement, up to and inclusive of the date of the withdrawal.

iii. Upon notification of the acceptance of its withdrawal from this Agreement, the withdrawing Party shall, within 30 days from the date of the notification, pay all the costs payable by the withdrawing Party under this Agreement which are due on or before the date of its withdrawal. Any payment made is non-refundable.

iv. A Party who withdraws from this Agreement shall terminate its Service Contract within 30 days from the date of withdrawal.

ARTICLE V SUBSCRIPTION, MODIFICATION AND TERMINATION OF NETWORK SERVICES

4.1 Service Contract

(a) Each Party shall subscribe to the Services by signing a Service Contract ("Individual Service Contract") with the Service Provider for the procurement, installation, training, testing, commissioning and operation of the CRV network and the associated services. Each Party shall use the Service Contract template at Annex D of this Agreement for its Individual Service Contract and shall comply with the Service Contract Provisions at Annex D. Any modifications to the service performance should not be lower than the performance standards specified in the template or subsequently modified by the OOG.

(b) All modifications to Individual Service Contracts shall be approved by the OOG through the OOG Coordinator.

(c) The expiry dates specified in Individual Service Contracts shall be coordinated with the OOG prior to the respective contract signatures and shall in any case be aligned with the expiry date of the Framework Agreement.

(d) For the avoidance of doubt, the only Parties responsible for the fulfilment of the terms and conditions of the the Individual Service Contracts are the signatories to the Individual Service Contracts, and no Individual Service Contract shall be binding on third parties.

4.2 Modification of Network Configuration in Stage 2

(a) Should a Party desire to modify its Network configuration, the Party shall provide a written notice to the OOG Chairman with a description of the proposed modifications.

(b) Upon written agreement from the OOG Chairman, the requesting Party may enter into a written agreement with the Service Provider, if required, to modify the Network.

(c) The Party shall bear the full costs of the modification, if any. In the event that this modification affects other Parties, the OOG shall review the modification costs and the modification works that will be incurred by the other Parties and the modification shall only be carried out upon approval by the OOG Chairman.

(d) Should a Party require urgent network rectifications such that its Network configuration needs to be temporarily modified by the Service Provider, the Party shall be required to inform the OOG Chairman on the modification at the earliest possible time. Upon Service recovery, the network shall be restored to its original working configuration by the Service Provider.

4.3 Subscription of new network service(s) / and add new application

(a) No Party shall subscribe to a new network service without the prior approval of the OOG Chairman.

4.4 Termination of Service Contract

(a) Should any Party desire to terminate its Service Contract with the Service Provider, the Party shall give not less than 90 days' advance notice in writing to the OOG Chairman and before having notified its intention to the Service Provider. The Party shall submit a plan to the OOG Chairman on how to continue its Air Traffic Services with the other Parties after the termination of its Service Contract.

(b) A Party which terminates its Service Contract will be deemed to withdraw from this Agreement with effect from the date of the termination of its Service Contract.

ARTICLE VI COST

7.1 Each Party shall be responsible for payment of its share of the costs associated with its participation in this Agreement.

7.2 Each Party shall maintain itself in good financial standing to avoid any adverse technical or financial impact on the other Parties to this Agreement or on the provision of the Services.

7.3 The cost allocation for the participation in this Agreement shall be based on user-pay principle. All the costs arising from the procurement preparation and acquisition of the CRV network and the Services in Stage 1 shall be equally divided and shared among the Pioneer Parties as detailed in **Annex E-1**. The costs payable under the Service Contracts shall be born solely by the respective Parties signing the Service Contracts with the Service Provider.

7.4 Other costs in Stage 2 shall be determined by the OOG. The allocation of these costs to each Party shall be agreed by the Parties at the commencement of Stage 2. The agreed cost allocation will be specified in **Annex E-II** which shall be separately signed by all Parties when it is ready.

ARTICLE VII LIABILITY

8.1 Unless otherwise stated in this Agreement or its Annexes, no Party shall be liable for acts or omissions of any other Party which is done or to be done in the course of, or as a result of, executing this Agreement.

ARTICLE VIII VARIATION AND TERMINATION

9.1 Variation

(a) This Agreement shall not be varied, modified or supplemented by the Parties in any manner, except in writing signed on behalf of each of the Parties by a duly authorised officer or representative. Any request for a

variation, modification or supplement to this Agreementshall be submitted for review by the requesting Party to the CRV Coordinator or the OOG Chairman, as the case may be; and shall be agreed by all Parties after taking into consideration the views and recommendations of the CRV Coordinator or the OOG Chairman, as the case may be.

9.2 Termination

(a) This Agreement may be terminated by mutual agreement of all Parties. If a Party defaults in or breaches any term of this Agreement, the OOG may terminate the Party's membership in accordance with the terms set out in Annex C.

(b) Notwithstanding the Party's termination from this Agreement, no provision of this Agreement shall be construed to relieve the defaulting Party of its obligations under the terms and conditions of this Agreement, up to and inclusive of the date of the termination.

(c) Any Party who defaults in this Agreement or terminates its Service Contract with the Service Provider, without withdrawing from this Agreement in accordance with Article 5.2, shall be liable for its obligations under the terms and conditions of this Agreement, up to and inclusive of the date of termination, and all outstanding payments that are due on or before the date of termination, including the termination fees (if applicable). Payments made by the defaulting Party prior to the date of termination shall not be refundable and shall not be used to offset any other payments by the defaulting Party, which will be due on or before the date of termination.

ARTICLE IX PROCEDURES FOR DISPUTES

10.1 Any dispute relating to the interpretation or application of this Agreement or its Annexes, which cannot be settled by negotiation shall, upon the request of any Party to the dispute, be referred to the OOG through the OOG Coordinator for its recommendation on a possible solution to the dispute. The OOG Coordinator will consider the request according to terms set out in Annex C.

ARTICLE X ENTIRE AGREEMENT

11.1 This Agreement (including the Annexes hereto) constitutes the entire agreement between the Parties in relation to its subject matter and supercedes all prior or contemporaneous agreements and understanding whether oral or written with respect to that subject matter.

ARTICLE XI RIGHTS OF THIRD PARTIES

14.1 No State or other entity which is not a party to this Agreement shall have a right under the Rights of Third Parties Act to enforce any of its terms.

ARTICLE XII LOCAL GOVERNMENT REGULATIONS

15.1 Each Party, if applicable, shall, at its own costs, obtain and maintain all licences, fees and authorisations, including export licences and permits and other governmental authorisations or certification required without any restrictions or qualifications whatsoever to the rest of the Parties, so as to enable the Service Provider to fulfil all its obligations under the Service Contract.

ARTICLE XIII APPLICABLE LAW

16.1 This Agreement shall be subject to, governed by and interpreted in accordance with English Law.

Sample of Authorized Representative Signatory Page

Authorized Representative (Pioneer Party 1)
_____ Signature of Authorized Representative Name: Designation: State/ANSP/Organisation: Date:
_____ Signature of Witness Name: Designation:
_____ Signature of CRV Coordinator Name: Designation:

Authorized Representative (Pioneer Party 2)
Signature of Authorized Representative Name: Designation: State/ANSP/Organisation: Date:
Signature of Witness Name: Designation:
Signature of CRV Coordinator Name: Designation:

Authorized Representative (Ordinary Party 1)
Signature of Authorized Representative Name: Designation: State/ANSP/Organisation: Date:
Signature of Witness Name: Designation:
Signature of OOG Chairman Name: Designation:

Authorized Representative (Ordinary Party 2)
Signature of Authorized Representative Name: Designation: State/ANSP/Organisation: Date:
Signature of Witness Name: Designation:
Signature of OOG Chairman Name: Designation:

Annex A

ICAO Contracting States:

- Afghanistan
- Australia
- Bangladesh
- Bhutan
- Brunei Darussalam
- Cambodia
- China, Hong Kong, China and Macao, China
- Cook Islands
- Democratic People's Republic of Korea
- Fiji
- India
- Indonesia
- Japan
- Kiribati
- Lao People's Democratic Republic
- Malaysia
- Maldives
- Marshall Islands
- Micronesia (Federated States of)
- Mongolia
- Myanmar
- Nauru
- Nepal
- New Zealand
- Pakistan
- Palau
- Papua New Guinea
- Philippines
- Republic of Korea
- Samoa
- Singapore
- Solomon Islands
- Sri Lanka
- Thailand
- Timor Leste
- Tonga
- Vanuatu
- Vietnam

Non-Contracting State

- Tuvalu

Territories

- Chile: Easter Island
- France: French Polynesia, New Caledonia, Wallis and Futuna Islands
- New Zealand: Niue
- United Kingdom: Pitcairn Island
- United States: American Samoa, Guam, Johnston Island, Kingman Reef, Midway, Northern Mariana Islands, Palmyra, Wake Island

- Any any other entity as agreed by the CRV coordinator (Stage 1) or OOG chairman (Stage 2)

ANNEX B STAGE 1: PROCUREMENT MANAGEMENT
(INCLUDING MANAGEMENT SERVICE AGREEMENT WITH ICAO TCB)

Annex B-1

STAGE 1: PROCUREMENT MANAGEMENT

ARTICLE B-I - PURPOSE OF THE PROCUREMENT

1.1 The purpose of the procurement is to formally invite service providers to provide proposals to best meet specified CRV network requirements for the Asia-Pacific Region, through a Sealed Tender invitation, in a fair and competitive manner.

ARTICLE B-II – PROCUREMENT ACTIVITIES

SCOPE OF WORK OF TCB

2.1 All Parties jointly agree that the TCB shall be appointed by the Pioneer Parties to act on behalf of the Pioneer Parties, under the directions of the CRV Task Force, to be responsible for the following activies:

(a) Review the technical specifications provided by the CRV Task Force with the aim to have SMART (Simple, Measurable, Assignable, Realistic and Time-related) and consolidated requirements;
(b) Develop the evaluation criteria for CRV Task Force consideration and finalisation;
(c) Prepare tender documents including integrating the technical specifications, the standard terms and conditions of contracts and any other information required in the tender documents;
(d) Investigate market and propose and identify suitable suppliers to register with ICAO, including those having participated in the RFI;
(e) Advertise Sealed Tender (ST) on ICAO's tendering website and notify the suppliers that have registered for this particular tender (Registered Tenderers, RT);
(f) Coordinate any site survey needed by RT;
(g) Handle all the tender clarifications in consultation with the CRV Task Force, organisation of tender clarification meetings (by telephone, web conference, etc), and fair dissemination of information to all RT;
(h) Optionally, to set up a Face to Face meeting with RT to exhaust questions before submission of responses;
(i) Receive tender responses at ICAO's tendering website, carry out a

pre-evaluation, and provide support to the CRV Tender Evaluation Committee meetings, including a final physical evaluation meeting);

(j) Participate as a technical advisor to the CRV Task Force for the RFI and tender preparation and evaluation; and

(k) Prepare Service Contract.

2.2 The TCB shall ensure that the tender Proposals that qualify for further evaluation meet or exceed the critical evaluation criteria, including but not limited to the following:-

(a) Adequate financial resources to perform the Contract;

(b) Good performance records and prior experience for similar works; and

(c) Not debarred by any States / Administrations from entering any Contract;

RESPONSIBILITIES OF THE PIONEER PARTIES IN THE PROCUREMENT

2.3 All Pioneer Parties jointly agree that each will be responsible for the following scope of works:

(a) Recommend potential service providers to ICAO (Service Providers must register with ICAO in order to receive copy of the tender documents for the CRV);

(b) Provide its requirements and technical specifications of the CRV network to the CRV Task Force for the RFI and tender preparation;

(c) Prepare the RFI documents;

(d) Evaluate responses received from the RFI and finalise the tender requirements specifications;

(e) Evaluate tender responses if selected to be in the CRV Tender Evaluation Committee;

(f) Be involved in any stage of the procurement process as and when required; and

(g) Award the Framework Agreement with the selected Service Provider.

ARTICLE B-III – ESTIMATED COST OF ENGAGING TCB

3.1 The Estimated Cost of engaging TCB for the procurement is about **$XX** (US Dollars). The actual cost will be capped at a total of **$XX** (US Dollars) should it exceed the estimated cost. The actual cost will be derived based on the total of the sum (to be determined) for the scope of works agreed to by TCB and a fixed sum as advised by TCB.

ARTICLE B-IV – COMPOSITION OF THE TENDER EVALUATION COMMITTEE

4.1 All Pioneer Parties will automatically be the members of the Tender Evaluation Committee (TEC).

4.2 The Tender Evaluation Committee shall decide and agree on the tender evaluation and selection criteria before the Tender invitation. Appropriate scoring systems such as Analytical Hierarchy Process (AHP) shall be used for tender evaluation. The parameters of the scoring system shall be determined before the tender invitation.

4.3 The tender responses shall be evaluated and selected according to the agreed evaluation and selection criteria and using the selected scoring system.

4.4 All members of the Tender Evaluation Committee shall have equal voting rights and the decision shall be based on simple majority.

ARTICLE B-V – PAYMENT TERMS OF TCB FEE

5.1 The Pioneer Parties shall make payment of 20% of the total estimated value of the TCB Fee within 30 days from the signing of the Management Service Agreement (MSA) or from the receipt of TCB's invoice, whichever is later.

5.2 The remainder of the total actual cost of the TCB Fee shall be due on the date of award of the Framework Agreement or a date to be mutually agreed between the Parties and TCB in the event of No Award. The Parties shall pay this remaining sum within 30 days from the due date or from the receipt of the invoice from TCB, whichever is later.

Annex B-2

MANAGEMENT SERVICE AGREEMENT WITH ICAO TCB

ARTICLE B-VI – MANAGEMENT SERVICE AGREEMENT WITH ICAO TCB

6.1 All Pioneer Parties commit to comply with the Management Service Agreement hereafter.

ANNEX C STAGE 2: PAYMENT OF SERVICE CONTRACT AND OOG MATTERS.

Annex C-1

ARTICLE C-I: PAYMENT OF SERVICE CONTRACT FOR STAGE 2

1.1 Each Party shall pay for the entire cost of its Service Contract with the Service Provider.

1.2 The sharing of all other costs associated with the operation and management of the CRV and the Services shall be determined and agreed between the Parties at a later stage. The agreed cost sharing principles for Stage 2 shall be set out in Annex E-II and signed by all Parties before commencement of Stage 2.

ARTICLE C-II: OOG MEMBERS AND OOG CHAIRMAN

1.1 The Parties of this Agreement who have Service Contracts with the Service Provider in force shall automatically be appointed as the OOG members.

1.2 The Chairman of the OOG will be elected by its members upon the establishment of the OOG. The election of Chairman will be held regularly in accordance with the rules and regulations of the OOG.

ARTICLE C-III: RESPONSIBILITIES OF THE OOG CHAIRMAN

2.1 The OOG Chairman will take over the role from the CRV Coordinator in CRV Stage 2.

2.2 The OOG Chairman is the focal point and is responsible for the administration of this Agreement during Stage 2. The OOG Chairman shall also handle all inquiries on and requests for variations, modifications or supplements to this Agreement. The role of the OOG Chairman shall be rotated and appointed by the OOG Members on regular basis, in accordance with the governing rules and regulations of OOG.

ARTICLE C-IV: MEETINGS AND TELECONFERENCES

<u>OOG Meetings</u>

3.1 Based on the OOG's Terms of Reference and its work program, the OOG Chairman shall convene OOG meetings with all its OOG Members, as scheduled and as required.

3.2 The meetings will discuss the provision, administration, operation, maintenance, modification, upgrading and/or any other issues pertaining to the Network and Services.

OOG Teleconferences

3.3 In between the OOG meetings, the OOG Chairman shall convene OOG Teleconferences as and when required, to discuss and follow-up on the technical, administrative, operational and/or any other issues pertaining to the Network and the Services.

3.4 The respective durations, frequencies, venues and provisional agenda of the scheduled meetings and regular teleconferences shall be determined by the OOG.

3.5 The OOG Chairman may convene non-scheduled meetings or Teleconferences to address other business that require immediate discussion.

ANNEX D: SERVICE CONTRACT WITH THE TELECOMMUNICATION SERVICE PROVIDER AND PROVISIONS TEMPLATE

<<To be inserted>>

When the general provisions, ALL new Parties will agree and commit to apply the general provisions what is negotiated. (To be put into the main body)

ANNEX E: COST

ANNEX E-I: COST SHARING OF TCB FEE BY PIONEER PARTIES

1.1 The TCB fee shall be equally divided and shared among the Pioneer Parties. The following cost allocation is applicable to all the Pioneer Parties of this Agreement in the amounts set out below.

S. No	Party	Cost Allocation in percentage (%) per Pioneer Party
1	Australia	(100/Z)%
2	China	(100/Z)%
3	Fiji	(100/Z)%
4	Hong Kong	(100/Z)%
5	India	(100/Z)%
6	Japan	(100/Z)%
7	New Zealand	(100/Z)%
8	Singapore	(100/Z)%
9	Thailand	(100/Z)%
10	USA	(100/Z)%
11	ANSP XX	(100/Z)%
12	ANSP YY	(100/Z)%
..	..	..
..	..	..
$Z^{\#}$	ANSP ZZ	(100/Z)%*
	Total	100%

#Where 'Z' is the total number of Pioneer Parties as of the cut-off date in Stage 1.

**The actual percentage (% per Party shall be rounded-up to two decimal points for convenience of calculation. Similarly, the actual amount in $ (US Dollar) shall be rounded-up to two decimal points.*

1.2 All Pioneer Parties shall be responsible for their respective shares of the payments to TCB in accordance with the terms of this Agreement and MSA.

Annex E-II: COST SHARING OF OPERATION AND MANAGEMENT (O&M) OF CRV AND OOG ADMINISTRATION

2.1 The cost of O&M of CRV and OOG Administration shall be shared among the Parties. The cost allocation shall be determined in Stage 2 by the OOG Members. The following cost allocation is applicable to all the Parties of this Agreement in the amounts set out below.

S. No	Members	Cost Allocation in percentage (%) per Member
1	Afghanistan	
2	Australia	
3	Bangladesh	
4	Bhutan	
5	Brunei Darussalam	
6	Cambodia	
7	China, Hong Kong, China and Macao, China	
8	Cook Islands	
9	Democratic People's Republic of Korea	
10	Fiji	
11	India	
12	Indonesia	
13	Japan	
14	Kiribati	
15	Lao People's Democratic Republic	
16	Malaysia	
17	Maldives	
18	Marshall Islands	
19	Micronesia (Federated States of)	
20	Mongolia	
21	Myanmar	
22	Nauru	
23	Nepal	
24	New Zealand	
25	Pakistan	
26	Palau	
27	Papua New Guinea	
28	Philippines	
29	Republic of Korea	
30	Samoa	

S. No	Members	Cost Allocation in percentage (%) per Member
31	Singapore	
32	Solomon Islands	
33	Sri Lanka	
34	Thailand	
35	Timor Leste	
36	Tonga	
37	Vanuatu	
38	Vietnam	
39	Tuvalu	
40	Chile: Easter Island	
41	France: French Polynesia, New Caledonia, Wallis and Futuna Islands	
42	New Zealand: Niue	
43	United Kingdom: Pitcairn Island	
44	United States: American Samoa, Guam, Johnston Island, Kingman Reef, Midway, Northern Mariana Islands, Palmyra, Wake Island	
	Total	100%

**The actual percentage (% per Party shall be rounded-up to two decimal points for convenience of calculation. Similarly, the actual amount in $ (US Dollar) shall be rounded-up to two decimal points.*

2.2 All Members shall be responsible for their respective shares of the cost of the O&M and OOG Administration in accordance with the terms of this Agreement.

MANAGEMENT SERVICE AGREEMENT

BETWEEN
THE INTERNATIONAL CIVIL AVIATION ORGANIZATION
AND
THE CIVIL AVIATION AUTHORITIES AND/OR RELATED ANSPs OF THE PARTICIPATING STATES

The CIVIL AVIATION AUTHORITIES AND/OR RELATED ANSPs, hereinafter referred to as the "*Participating States"*, represented by their respective authorities and

The International Civil Aviation Organization, hereinafter referred to as "ICAO", represented by the Secretary General;

Hereinafter referred to as the "Parties";

AGREE ON THE FOLLOWING:

1. GENERAL PROVISIONS

1.1 The Parties agree to enter into an agreement regarding management and other support services to be provided by or through ICAO, as specified in this Management Service Agreement (hereinafter referred to as "this Agreement").

1.2 A detailed description of the Project(s) in relation to which specific Services are going to be provided will be set out in and designated as Annex(es) to this Agreement.

1.3 Services to be provided by or through ICAO under this Agreement in response to requests submitted by the *Participating States* shall be furnished under the direction of the Director, Technical Co-operation Bureau of ICAO on behalf of the *Participating States*. Nevertheless, the *Participating States* shall retain overall responsibility for the implementation of the Project(s).

1.4 The services shall be approved by ICAO and shall be specified in the Annex(es) to this Agreement (hereinafter referred to as "the Services"). Such Services shall be provided in accordance with ICAO's policies, practices, procedures and rules and subject to all necessary funds having been made available to ICAO.

1.5 The specific responsibilities of the Parties with regard to the contribution for the implementation of Project(s) shall be outlined as inputs in the Annex(es) to this Agreement.

1.6 ICAO and the *Participating States* shall maintain close consultations respecting all aspects of the provision of the Services contemplated under this Agreement.

1.7 Any change to the duration of the Agreement and/or the scope of the Project(s) shall require negotiations between the Parties.

1.8 ICAO shall, on behalf of the *Participating States*, contract for inputs required for the provision of the Services specified in the Annex(es) to this Agreement. The recruitment of personnel and the signature of contracts shall be subject to prior approval by the *Participating States*.

1.9 In the performance of the duties the personnel or contractors shall collaborate closely with officials of the *Participating States* and shall help to execute the Project(s) in conformity with such general guidelines as the *Participating States* may establish in consultation with ICAO. The latter shall furnish to the above-mentioned personnel or contractors whatever guidance ICAO deems necessary for the successful implementation of the Services.

1.10 Unless agreed otherwise by the *Participating States* and ICAO in the Annex(es) to this Agreement, the *Participating States* shall be solely responsible, using funds other than those specified in the Annex(es), for the recruiting of local personnel and payment of their salaries and benefits, as well as for the administrative support (local secretarial and personal services, offices, locally produced equipment and supplies, transportation within the country, and communications) required for the execution of the Project(s) and the provision of the Services and related support.

1.11 The funds and activities under this Agreement shall be administered according to applicable ICAO regulations, rules, directives, procedures and practices.

1.12 The obligations assumed by the parties under this Agreement shall continue to exist after termination of this Agreement to the extent necessary to permit the orderly finalization of activities, the withdrawal of personnel, the distribution of funds and assets, the liquidation of accounts existing between the parties, and the settlement of contractual obligations. Additional funds, if necessary, to cover the above-mentioned expenditures shall be provided by the *Participating States.*

2. FINANCING PROVISIONS

2.1. The estimated total cost of the Services will be indicated in the Annex(es) to this Agreement. For management of the Services, ICAO shall be paid Administrative Charges as indicated in the Annex(es). The total cost (Services and Administrative Charges) of the Project(s) may not exceed the amount reflected in the Annex(es) without the prior agreement of the *Participating States*.

2.2. Upon signature of the Annex(es), the *Participating States* shall deposit the amounts detailed in the Annex(es) to cover the estimated cost of the Services and Administrative Charges.

2.3. All cash receipts to, and payments made by, ICAO under this Agreement shall be recorded in a separate account, opened, *inter alia,* in order to place on record the receipt and administration of payments. All payments made to ICAO shall be made in U.S. dollars and deposited in ICAO's bank account as follows:

Pay to: //CC000305101
Royal Bank of Canada
Ste. Catherine and Stanley Branch
1140 Ste. Catherine Street West
Montreal, Quebec
Canada H3B 1H7

For credit to: 05101 404 6 892
Project: Common Regional Virtual Private Network (CRV).
ICAO Pool Account

Swift code: ROYCCAT2

2.4. ICAO shall not be obliged to begin or continue the provision of the Services until the payments mentioned in paragraphs 2.2 and 2.6 of this Agreement have been received and ICAO shall not be obliged to pay or commit any sums exceeding the funds deposited in the aforementioned account.

2.5. ICAO shall furnish the *Participating States* with unaudited financial statements concerning the Services covered in this Agreement, showing the status of the funds in U.S. dollars as at the end of March, June, September and December. After ICAO has concluded the provision of the Services, it shall submit to the *Participating States* a final financial statement. In the event that the *Participating States* request that a special audit/evaluation of its account or project under this Agreement be performed by the Internal or External Auditor of ICAO, the *Participating States* shall bear the cost of such audit.

2.6. If due to unforeseen circumstances the funds received under this Agreement should prove insufficient to cover the total cost of provision of the Services and Administrative Charges, ICAO shall inform the *Participating States* to that effect and additional funds, if required, shall be made available to ICAO before the continuation of the project.

2.7. Any balance of funds not disbursed and not committed at the conclusion of the Services shall be returned to the *Participating States* on request, or be retained in the account for future use as defined by the *Participating States*.

3. PROCUREMENT SERVICES PROVISIONS

3.1. ICAO shall acquire, at the request and on behalf of the *Participating States* and in conformity with this Agreement and ICAO's Procurement Code, the necessary equipment and supplies described in the Annex(es) to this Agreement or requested directly from the *Participating States* through an official communication to ICAO:

3.1.1. Following the (site) acceptance of the service by ICAO on behalf of the *Participating States*, title of ownership, and all associated risks of loss or damage, shall pass automatically from the supplier of the service to the *Participating States*.

3.1.2. The *Participating States* shall be responsible for the custom clearance process. Should the costs resulting from tariff duties, taxes or similar fees directly related to the release from customs of the

equipment and supplies not be subject to exemption by the Government, the*Participating States* shall be responsible for defraying such costs using funds not proceeding from those specified in the Annexes.

3.1.3. The Administrative Charge fees will be phased according to the degree of advancement of the procurement process (20% at the issuance of the tender, additional 30% when the evaluation process has been completed and the balance upon signature of the purchase order/contract). Should an on-going Purchase Requisition approved by the *Participating States*be cancelled before the purchase is effected, ICAO shall be entitled to recover its costs based on the amount of work that has been completed in the implementation of the said Purchase Requisition. ICAO will invoice the corresponding amount to the *Participating States*.

3.1.4. An amendment to a Purchase Order/Contract shall not decrease the Administrative Charges associated with the issuance of the original Purchase Order/Contract.

4. DISPUTES RESOLUTION (SETTLEMENT OF DISPUTES)

4.1 Any dispute, controversy or claim arising out of or relating to this Agreement, or the breach, termination or invalidity thereof, shall be settled, in the first instance, by direct negotiations between the parties. If unsuccessful, such dispute, controversy or claim shall be settled by arbitration in accordance with the United Nations Commission on International Trade Law (UNCITRAL) Arbitration Rules, as in force at the time of arbitration. The place of arbitration shall be Montreal, Province of Quebec, Canada, conducted in the English language. Arbitration shall be conducted by one arbitrator. The arbitral award shall contain a statement of reasons on which it is based and shall be accepted by the Parties as the final adjudication of the dispute.

5. ICAO PRIVILEGES AND IMMUNITIES

5.1 Nothing in or relating to this Agreement shall be deemed a waiver, express or implied, of any immunity from suit or legal process or any privilege, exemption or other immunity enjoyed or which may be enjoyed by ICAO, its officers, staff, assets and funds either pursuant to the *Convention on the Privileges and Immunities of the Specialized Agencies, 1947* or other applicable conventions, agreements, laws or decrees.

6. CORRESPONDENCE

6.1 All correspondence relating to the implementation of this Agreement other than this signed Agreement or the amendments thereto, shall be addressed to:

ICAO:
Regional Director
Asia and Pacific Office
P.O. Box 11, Samyaek Ladprao
Bangkok 10901
Thailand

6.2 The *Participating States* shall keep ICAO duly informed of all measures which it adopts for the fulfilment of this Agreement or which may affect this Agreement.

7. ENTRY INTO FORCE, AMENDMENTS AND TERMINATION

7.1 This Agreement shall come into force on the date on which it has been signed by both parties. It shall continue to be in force until terminated under paragraphs 1.12, 7.2 and 7.3 below. Upon coming into force, it shall supersede existing Agreements concluded between the parties on the same subject matter.

7.2 This Agreement may be amended at any time by written agreement between the parties.

7.3 This Agreement may be terminated at any time, by either Party, giving to the other a written notification. This Agreement shall terminate sixty (60) calendar days after receipt of the notification.

Agreed on behalf of the International Civil Aviation Organization:

Signed by: _____

Name: _____

Title: _____

Date: _____

Agreed on behalf of the *Participating States*:

Signed by: Australia
_____

Name: _____

Title: _____

Date: _____

Signed by: China _____

Name: _____

Title: _____

Date: _____

Signed by: Fiji _____

Name: _____

Title: _____

Date: _____

Signed by: France _____

Name: _____

Title: _____

Date: _____

Signed by: Hong Kong China _____

Name: _____

Title: _____

Date: _____

Signed by: India _____

Name: _____

Title: _____

Date: _____

Signed by: Japan _____

Name: _____

Title: _____

Date: _____

Signed by: Malaysia _____

Name: _____

Title: _____

Date: _____

Signed by: New Zealand _____

Name: _____

Title: _____

Date: _____

Signed by: Singapore
_____

Name: _____

Title: _____

Date: _____

Signed by: Thailand
_____

Name: _____

Title: _____

Date: _____

Signed by: United States of America (USA)
_____

Name: _____

Title: _____

Date: _____

− END −

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Common Regional Virtual Private Network (CRV) Of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG)

Concept of Operations

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA-PACIFIC OFFICE

Document Change Record

Version Number	Date	Reason for Change	Sections Affected
0.1	March 1, 2014	Initial Draft	All
0.2	March 28, 2014	Addition of Section 4	4
0.3	April 02, 2014	• Inclusion of comments from ICAO • Result of review by CRV Participants on 02 April14 Meeting	All
0.4	April 30, 2014	Modifications resulting from review in 0.3 above	All

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1 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide a Concept of Operations (ConOps) for a Common Regional Virtual Private Network (CRV) to serve the Asia/Pacific Region. This would be an Internet Protocol (IP) based VPN using a private commercial network to provide service for the exchange of Air Traffic Service Message Handling System (AMHS) data and potentially other types of data. The Air Navigation Service Providers (ANSPs) of the Asia/Pacific Region see a clear need for an upgrade to the current telecommunications network, and the CRV is the recommended solution as determined by the Aeronautical Communication Services Implementation Coordination Group (ACSICG) of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) of the International Civil Aviation Organization (ICAO).

1.2 Background / Current Capability

Currently, aeronautical ground-ground communications in the ICAO Asia/Pacific Region, and in particular Aeronautical Fixed Telecommunication Network (AFTN) and AMHS services, ~~in the ICAO Asia/Pacific Region~~ operate over point-to-point international leased circuits. As pointed out by the ICAO survey on ground-ground communications performed early 2014, ~~T~~this network configuration exhibits a number of limitations~~,~~ , including (but not limited to):

- cost limitations: ~~Potentially~~ high costs per connection~~n~~;
- a marked obsolescence threat due to ageing technologies and protocols (IPL, X25 etc);
- a need for telecommunication backup or diversity, although the current reliability is assessed as rather satisfactory;
- problems experienced with change management:
  - Need for separate requisition process for each new connection, generally a time-consuming and cumbersome process
  - Limited flexibility for increase in bandwidth
  - Limited flexibility for expansion to other end-points
  - Need to deal with half circuit vs. full circuit arrangements, depending upon policies of ANSPs involved

- A design that is not adapted to the current and new needs:
  - Potential duplication of network services as bandwidth for other types of data are generally obtained separately;
  - the inability to switch to new protocols like VoIP or SWIM with an efficient network design; and
- Heterogeneous practices as to performance requirements and monitoring.

~~Others to be added……~~

~~In an attempt to resolve these issues, a~~A CRV Task Force (TF) was formally established in accordance with APANPIRG Decision (24/32), (Bangkok, Thailand, 24-26 June 2013).

There it was determined that a dedicated, common network operated by a service provider is a viable approach to be considered to replace the current configuration. Common networks have successfully been deployed in other ICAO regions (e.g. PENS in the EUR Region and MEVA in the CAR Region). Therefore, the Meeting adopted the following decision:

- **Decision 24/32 - Common Regional Virtual Private Network (VPN) Task Force**

That, a Task Force with Subject Matter Experts (SME) be established to study the virtual private network and develop a detailed proposal by 2016. The Task Force reports the outcome of its study to APANPIRG through ACSICG and CNS SG.

1.3 Geographic Applicability

The initial intended geographic coverage of the CRV consists of the accredited States and Territories to ICAO Asia Pacific Regional Office.

1.4 Intended Audience

This ConOps presents a vision for establishing an IP VPN to provide efficient, cost-effective network services for AMHS and other IP-based services. The intended audience of this ConOps is the membership of ACSICG and all stakeholders who are interested in the acquisition and implementation of the CRV, including all interested parties of each ANSP in the ICAO Asia/Pacific Region. The document will also be presented to APANPIRG to be used during the approval process for the CRV. It can be used as a source of information for the development of the Request for Information (RFI) and Sealed Tender (ST) to be written and provided to potential vendors as part of the tender process.

1.5 Intended Benefits

The Asia/Pacific VPN is anticipated to provide a broad range of benefits to the CRV Members, including (but not limited to):

- Cost efficiencies as compared to multiple point-to-point connections
- Reduced procurement time and effort, as each ANSP will require only the initial connection to the CRV
- Potential to carry new services (i,e, ATFM, SWIM, etc.)
- Transition from the current bandwidth limitations to an harmonized and homogeneous level of network performance and services delivered by the CRV Service Provider, including ease of growth, connectivity and modification
- Potential for additional connectivity beyond the initial AFTN-like routing network, including both regional and inter-regional connectivity
- Greater ease of handling of network service issues

(Zaki to propose a common wording with DOA)

2 OPERATIONAL CONCEPT

2.1 Objective

The objective of the CRV is to offer a safe, secure, robust and cost effective telecommunications transport service to all Members, and to offer the possibility to all Candidates to contract to that service.

It will facilitate voice and data communications between Members by allowing all participants on the network to establish communications with each other. Telecommunication costs will be minimized as countries will only need a small number of connections to a far reaching network, rather than individual connections to each neighboring state.

Each user of the network will take responsibility for their own IT security. However, the network will support this security by being a closed private network, without access to the public Internet. Each Member can (and should) establish IT security protections so that they comply with their organization's security policies. At their discretion, some Members may also establish bi-lateral VPN overlays over the CRV to provide an additional layer of protection.

Finally, the network should support the telecommunication standards which the Region intends to use. Accordingly, it should carry both IP version 4 and 6.

2.2 Scope

The scope of the CRV is to provide a cross-border telecommunications network for Members in the ICAO Asia/Pacific Region. This network will allow each Member to easily communicate with any other Members in the Region. To facilitate the creation and on-going operation of this network, this document also includes the creation of the business rules and management for the network.

The network will be used to support the delivery of ATM services. It must be fit for purpose so that each ANSP can provide the highest levels of safety.

Finally, it is possible that over time the network will grow to include other users such as the military, airport, ATM industry and airlines. If this does occur then it is anticipated

that this document will be revised to accommodate the increased scope of the additional stakeholders. If widely adopted, the CRV is a strong candidate to provide the network which underpins the future System Wide Information Management (SWIM).

2.3 Services Carried by the CRV Network

- Ground-ground voice ATM communications, referred to as voice communications
- Air-ground Data Link communications (in case we have one day ATN routers in common), referred to as Data Link communications
- Ground-ground ATS surveillance data, referred to as surveillance data
- Ground-ground AIDC data, referred to as AIDC data
- Ground-ground AIM data, referred to as AIM data
- Ground-ground ATFM data, referred to as ATFM data
- Ground-ground SWIM data, referred to as ATFM data
- Miscellaneous data: other data not pertaining to the categories above, or carried for TEST purpose only
- Any other category as agreed later

2.4 Use Cases

The Use Cases contained in this section illustrate how the proposed capability will operate and how users will interact.

2.4.1 Use Case 1 - ANSPs Interconnect AMHS

Summary of Situation

ANSP ‘A’ and ANSP ‘B’ wish to have a direct connection between their AMHS. Both ANSPs decide that the AMHS application shall be built upon the Aeronautical Telecommunication Network (ATN). The ATN will in turn use the CRV.

User Response

Each ANSP already has a connection to the CRV. Each ANSP:

1. Notifies the CRV Coordinator of their intention to establish the new facility.
2. Determines if their existing access speed is sufficient. If it is not the ANSP will arrange with the CRV Service Provider to increase their bandwidth.

3. Negotiates bi-laterally with the other ANSP to determine what IT security arrangements are required. In this User Case they decide to implement an IPSec VPN.
4. Negotiates bi-laterally with the other ANSP to determine what testing, acceptance and commissioning procedures are required.

Operational Needs

UC1.1 The CRV must meet the reliability and availability needs of AMHS.
UC1.2 The CRV must provide IP version 4 transport for the ATN.
UC1.3 The CRV must provide IP version 6 transport for the ATN.
UC1.4 The CRV must allow the ANSPs to implement IPSec VPN tunnels.
UC1.5 The CRV must allow for bandwidth changes.

2.4.2 Use Case 2 - ANSPs Implement ATC Voice Co-ordination Circuits

Summary of Situation

ANSPs 'A' and 'B' wish to build upon the success of their AMHS implementation and have identified four voice circuits which should be moved to the CRV.

User Response

Each ANSP already has a connection to the CRV. Each ANSP:

1. Notifies the CRV Coordinator of their intention to establish the new facility.
2. Determines if their existing access speed is sufficient. If it is not the ANSP will arrange with the Service Provider to increase their bandwidth.
3. Negotiates bi-laterally with the other ANSP to determine what IT security arrangements are required. In this User Case they decide to not implement an IPSec VPN as they see that their existing firewalls provide a compliant level protection.
4. Negotiates bi-laterally with the other ANSP to determine what testing, acceptance and commissioning procedures are required.
5. Each ANSP will tag the Voice Over Internet Protocol (VoIP) and Session Initiation Protocol (SIP) data with appropriate priority markings to allow the CRV Service Provider to identify the voice traffic.

Operational Needs

UC2.1 The CRV must meet the reliability and availability needs of ATC voice.
UC2.2 The CRV must provide IP version 4 transport for the VoIP.
UC2.3 The CRV must provide IP version 6 transport for the VoIP.
UC2.4 The CRV will use the high priority tags in the packet headers to ensure that VoIP traffic is given high priority and minimal delay. The CRV must give an appropriate level of priority to SIP.
UC2.5 The CRV must deliver voice so that it is clearly understood with minimal delay.

2.4.3 Use Case 3 - ANSPs Share Automatic Dependent Surveillance-Broadcast (ADS-B) Data Along Their Border

Summary of Situation

ANSP 'B' and ANSP 'C' decide that sharing ADS-B data from ground stations along their border will improve safety. They decide to use the CRV to transport the data.

User Response

Each ANSP already has a connection to the CRV. Each ANSP:

1. Notifies the CRV Coordinator of their intention to establish the new facility.
2. Determines if their existing access speed is sufficient. If it is not the ANSP will arrange with the Service Provider to increase their bandwidth.
3. Negotiates bi-laterally with the other ANSP to determine what IT security arrangements are required. In this User Case they decide to implement an IPSec VPN.
4. Negotiates bi-laterally with the other ANSP to determine what testing, acceptance and commissioning procedures are required.
5. Each ANSP will tag the ADS-B data with a medium priority marking to allow the CRV Service Provider to give it an appropriate transport.

Operational Needs

UC3.1 The CRV must meet the reliability and availability needs of informational ADS-B.
UC3.2 The CRV must provide IP version 4 transport for the ADS-B.
UC3.3 The CRV must provide low drop rates and latency for ADS-B.

2.4.4 Use Case 4: ANSP 'A' is Experiencing Poor AMHS Service with ANSP 'B'

Summary of Situation

ANSP 'A' notices that AMHS service is not reliable with ANSP 'B'.

User Response

ANSP 'A' and ANSP 'B' both start to diagnose the problem by:

1. Checking their systems.
2. Notifying the CRV Service Provider.
3. Hopefully at this point the problem is discovered and resolved.
4. If no fault is found then the CRV Coordinator is notified. Each ANSP verifies stability of their AMHS system, including the ability (or lack thereof) to communicate with other ANSPs. Local network elements will be verified, and end-to-end stepwise validation will take place. This will provide enough information to determine the location of the fault.
5. The fault is rectified.

Operational Needs

UC4.1 The CRV Service Provider and the CRV Members must have a clear fault resolution process.

2.4.5 Use Case 5 - ANSP 'A' is Experiencing Poor Voice Communications With ANSP 'B'

Summary of Situation

ANSP 'A' notices that when their voice calls go to ANSP 'B' that the call quality is poor.

User Response

ANSP 'A' starts to diagnose the problem by:

1. Checking their systems.
2. Notifying both the CRV Service Provider and ANSP 'B' of the problem.
3. Hopefully at this point the problem is discovered and resolved.
4. If no fault is found then the CRV Coordinator is notified. Each ANSP takes a packet capture of the voice call at the interface boundary. The packet captures are compared and examined for problems. This will provide enough information to determine the location of the fault.

5. The fault is rectified.

Operational Needs

UC5.1 The CRV Service Provider and the CRV Members must have a clear fault resolution process.

2.4.6 Use Case 6 - ANSP 'B' Has Two Access Points and One Fails

Summary of Situation

ANSP 'B' has two CRV access points, one in city Alpha and one in city Beta. City Alpha's connection fails.

User Response

ANSP 'B' responds by:

1. Notifying the CRV Service Provider of the problem. The CRV Service provider commences rectification action.
2. AMHS is unaffected, as ANSP 'B' is using ATN and the ATN has automatically detected the fault and redirected traffic to use the city Beta path.
3. Current voice calls fail, but ATC have been provided with two methods to make their calls, one which is via city Alpha and one by city Beta. ATC select the city Beta path and quickly re-establish communications.
4. The ADS-B sharing completely fails as it does not have a rerouting capability.
5. The CRV Service Provider fixes the fault and service delivery returns to normal.
6. The ANSP notifies the CRV Coordinator so that the performance of the CRV Service Provider is tracked.

Operational Needs

UC6.1 If an ANSP requires high availability then they must design into their applications a mechanism which can use dual CRV access points.
UC6.2 (optional) ANSPs wanting the network to automatically reroute in response to networking failures can implement bi-lateral measures.

2.4.7 Use Case X:the CRV network wants to connect to another Region (to be developed at a later stage)

Question to the vendors (RFI)? Proposed in the revised version of Scope and Structure of RFI

Action F.Lecat: to inform CRV about the PENS Service Provider now/in the future: SITA is the current provider.

2.5 ~~Measures of Effectiveness~~Safety case

The measures listed below are the minimum targets. Each state can modify these targets to meet their individual requirements.

[NOTE: The parameters listed below are a best guess. Are there some standards we can reference? Looking for additional input from those with familiarity.][LF1]

Voice Communications[LF2]
Mean Opinion Score of greater than 3.6
Packet loss rate of less than 1 in 500
Jitter of less than 30ms[LF3]

Surveillance Data[LF4]
Packet loss rate of less than 1 in 1000
Jitter of less than 300ms

Data Communications[LF5]
Packet loss rate of less than 1 in 1000

Availability
For any individual access link: Better than 99.0%
For a CRV Member that has two geographically diverse links: Better than 99.8%
For any group of 5 access links: Better than 99.95%

CRV will carry operational data, the failure of which may have impacts on the safety of operations. As safety risks must remain controlled, a Safety risk management process including hazard identification, safety risk assessment and the implementation of appropriate remediation measures has to be implemented.

The safety risk management component systematically identifies hazards that exist within the context of the delivery of CRV services. Hazards may be the result of systems that are deficient in their design, technical function, human interface or interactions with other processes and systems. They may also result from a failure of existing processes or systems to adapt to changes in the service providers' operating environments. Careful analysis of these factors during the planning, design and implementation phases can identify potential hazards before CRV becomes operational.

A list of Operational Hazards is attached to this CONOPS. The likelihood of their consequences occurring and severity will be assessed during the users' requirement process. For the risks that cannot be eliminated by design, the mitigation strategy to reduce the risks when it is not acceptable will be part of the user requirements, OOG procedures and/or CSP's procedures.

During the operational life cycle of the CRV network, reports or incident investigations will be analyzed by OOG to identify new safety hazards and/or monitor the frequency of occurrence. The escalation process will identify when any event is likely to have a safety impact handle it with appropriate care and urgency.

2.6 Stakeholders

Note: This section should be ignored for now, as it will be superseded by information currently being developed for insertion into both the DOA and this ConOps.

2.6.1 Introduction

The network will be initiated by CRV Members for the use of CRV Members. No other organizations can use the network.

2.6.2 Roles and Responsibilities

2.6.2.1 The CRV Member

The CRV Member means a State, Territory, International Organization which is a signatory to Document of Agreement for CRV, has entered into contractual agreement with the CRV Service Provider and is a fully functioning participant in the Network and, consequently of the corresponding Aeronautical Telecommunication Services. [LF6]

The CRV Member shall sign a service contract with the CRV Service Provider (the "Service Contract") for procurement, installation, training, testing, and operation of the common network. All modifications to individual Service Contracts shall be coordinated through the Operation Oversight Group (OOG) Coordinator.

2.6.2.1.1 The CRV Service Provider

The CRV Service Provider is the company which provides the telecommunications network services. The Service Provider will be selected through a transparent procurement process.

2.6.2.1.2 The CRV Coordinator

The CRV coordinator is the chairperson of the CRV Task Force.
The CRV Task Force has to:

a) Develop and propose to the APANPIRG a multinational agreement proposing the organizational policies and procedures for managing the regional network including inter-regional coordination;

b) Study and propose to the APANPIRG the concept of operation for common VPN for APAC Region including cost-benefit consideration;

c) Develop the RFI to be distributed to interested service providers and analyze questions/information received from RFI;

d) Develop the Request For Proposal (RFP) for common VPN for APAC Region and evaluate/select the best proposal; and

e) Develop the procedures for commissioning common VPN for APAC Region.

The CRV Members have asked the Asia/Pacific Office of the International Civil Aviation Organization to provide a leadership role in managing the network. This role, called the CRV Coordinator, has the responsibility of chairing the ~~OOG~~ CRV Task Force.~~and managing the CRV Service Provider~~.[LF7]

2.6.2.1.3 The Operational Oversight Group (OOG)

The ~~OOG provides~~ Operational Oversight Group has the responsibility of managing~~of the~~ CRV network operations.

1) OOG Meetings: Based on the OOG's Terms of Reference and the Work Programme assigned by the OOG Meetings, the OOG Coordinator shall convene OOG meetings of all technical representatives of the organizations, based on a rotational scheme or as required, to discuss the operation, maintenance and administration of the network. The period, location and draft agenda of the meeting shall be determined by the OOG coordinator.
2) OOG Teleconferences: The OOG Coordinator shall convene on a regular basis OOG Teleconferences, to discuss technical and / or administrative issues. The OOG

Coordinator may also convene non-scheduled Teleconferences to address other businesses that require immediate discussion, apart from the OOG Teleconferences.

2.6.2.1.4 The OOG Coordinator

The OOG Coordinator is the chairperson of the CRV OOG and -

1) Focal Point: The OOG Coordinator is the focal point for Aeronautical Telecommunication Services Common Regional Virtual Private Network (CRV) and shall be responsible for the administration of the CRV. The OOG Coordinator shall also handle all inquiries and requests for amendments to this CRVthe DOA after the contract is awarded.

2) Coordination and support to CRV candidates for signing the DOA

3) Coordination and support to CRV Parties for signing their Individual Service Contract based on the Service Contract template (refer to the Document of Agreement) and in compliance with Service Contract Provisions

4) Coordination and support of CRV Members for implementation[1] and termination of Service Contracts

5) Administration of the CRV operations according to the OOG policies and rules, in interface with the CRV Service Provider, the CRV Members and the ICAO Regional Office: fault management, configuration management, safety management, security management and performance management. As part of these activities, the safety case will be maintained vis-à-vis new applications or new connections.

6) Administration of the DOA after the contract awarding: handling of amendments to DOA (refer to DOA), -handling of disputes (refer to DOA).

[1] *Optional Implementation support: As an option, a State may need that ICAO Technical Cooperation Bureau act as its project manager for implementing the CRV deployment in that particular State. This agreement would be signed between that State and ICAO and authorize ICAO to manage the procurement, installation and commissioning of the services. Such a contract would be a MSA and be completely separate from the contract between the Community and the CRV Service Provider. In that case the coordination will be conducted between OOG coordinator, ICAO project manager (in coordination with the States representatives), and CRV Service Provider.*

2.6.3 Transition of responsibilities between stage 1 and stage 2 (CRV and OOG coordination)

- General description of stages 1 and 2
- Roles of CRV and OOG coordinators
- Principles for process of transition

To be drafted by Chonlawit

Optional Implementation support[LF8]: As an option, a State ~~Community~~ may ~~request~~ need that ICAO Technical Cooperation Bureau act as its project manager for implementing the CRV deployment in that particular State ~~through the ICAO CAPS Programme~~. This ~~contractual~~ agreement would ~~authorize ICAO~~be signed between that State and ICAO and authorize ICAO to manage the procurement, installation and commissioning of the services ~~on behalf of the community~~. Such a contract would be a MSA and be completely separate from the contract between the Community and the CRV Service Provider. ~~Requests for participation in the CAPS Programme shall be made in writing to the OOG Coordinator.~~ In that case the coordination will be conducted between OOG coordinator, ICAO project manager (in coordination with the States representatives), and CRV Service Provider.

2.7 Capability Description

The CRV is required to provide a telecommunications network between Members. While there are some common requirements, each Member will have different needs and it is expected that a variety of connections will be established.

2.7.1 Accessibility

The CRV Service Provider shall offer access to the CRV network to every Member. The location of the interface point shall be at the Member's premises.

2.7.2 Physical Connectivity Between Member and CRV Service Provider

The choice of physical connector type to be used between the Member and the CRV Service Provider is a matter for those two organizations to decide. Commonly this may be 100/1000 BaseT Ethernet; however, other technologies are possible.

Each Member will determine the number and location of connections to the CRV Service Provider. Those Members who chose to have more than one connection will gain the benefits of network diversity and higher availability. However, this diversity and higher

availability may be dictated at some connection points by the performance and safety requirements, depending of the role played by the Member regarding a particular application (example: hosting an application hub, or an interregional connection).

2.7.3 Access Bandwidth and Quality of Services (QoS)

Each CRV Member shall determine what amount of bandwidth they require for each Quality of Service (QoS) sub queue. For example, a Member may decide that they need 128kbps of high priority voice bandwidth, plus 512kbps of low priority traffic.

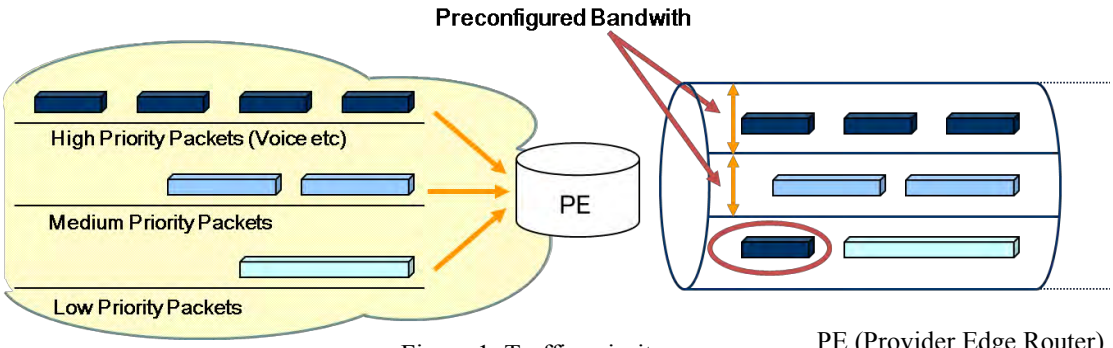


Figure 1: Traffic priority

PE (Provider Edge Router)

In addition, each CRV Member will determine the total access bandwidth that they need to purchase.

2.7.4 Network Security

The CRV is to be a private network, only available and dedicated to CRV Members. It is not to be connected to the public Internet and should not share the infrastructure with the public Internet. It is anticipated that Members will work bi-laterally to agree on their security arrangements so that they comply with their organizations' security policies and minimal requirements, if any, as set by the OOG Coordinator. Any change to these initial arrangements should be coordinated with the OOG Coordinator. Some members may choose to use only a firewall, while others may require a firewall and an encrypted VPN. The firewall is provided by the CRV Member and remains under its responsibility.
In Appendix A is provided a table of operational threats for each type of data.

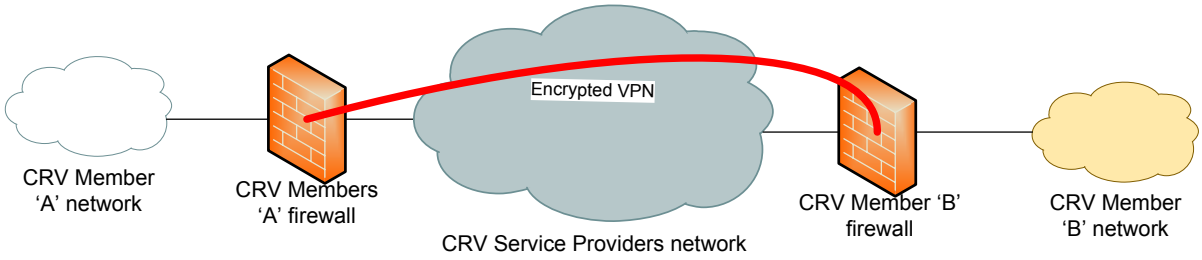


Figure 2: Example of an encrypted Virtual Private Network (VPN)

To facilitate these overlays the network will accommodate packets of at least 1550 bytes in length, without requiring packet fragmentation.

2.7.5 Capacity for Growth and Expansion

It is expected that the network will require greater speeds over time as more Members join and additional applications are added. If a Member requires a speed or class of service upgrade, this should ideally be a simple process whereby the Member contacts the OOG Coordinator to arrange for an upgrade.

2.7.6 Network Monitoring

The CRV Service Provider shall provide their networking equipment into the Members' premises. The CRV Service Provider shall manage and monitor the private network to promptly identify faults and performance degradations. On detecting an issue the CRV Service Provider will notify the CRV Member(s) and OOG coordinator and a fault rectification process will commence under the coordination by the OOG coordinator. In addition, the CRV Service Provider will provide the OOG coordinator with a remote supervision tool. [Need more discussion regarding this…]

2.7.7 Reporting

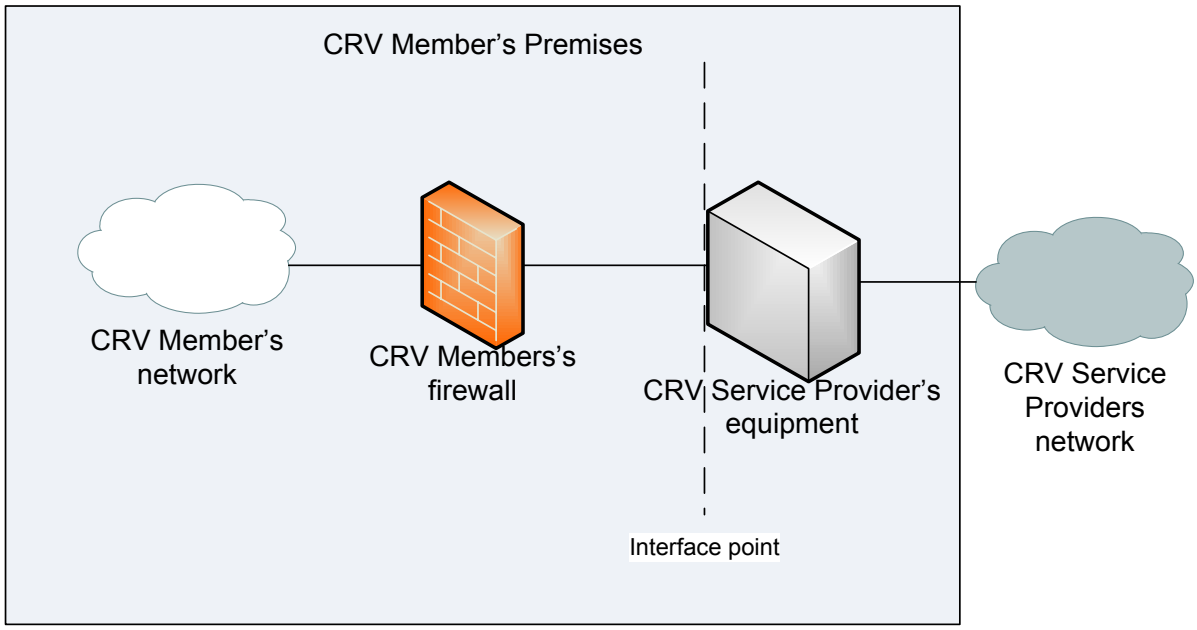
The CRV Service Provider shall provide a monthly performance report to the OOG Coordinator. The report shall include the availability of each access link, any areas of congestion and a summary of notable events (e.g. additions or removal of accesses, discussion on any failures, physical configuration, etc.). The Coordinator will make this report available to the all Members.

2.7.8 Service Notifications

The CRV Service Provider shall provide at least 10 days advance notice to a Member and OOG coordinator of any planned maintenance which will result in a loss or degradation of service.

2.7.9 Network Design and IP Addressing

The CRV Service Provider shall provide the network design. It is anticipated that the typical Member interface will adopt the interface design shown below.



IP version 4 and version 6 address space will be proposed by the CRV Service Provider and agreed with the CRV Coordinator during the procurement process. It is anticipated that Members will need to use Network Address Translation (NAT) due to the various IP addressing schemes used by the Members. The OOG Coordinator will manage the Regional IP address plan after the contract is awarded.

2.8 Support Environment

Day to day support will be provided by the CRV Service Provider. This includes issues such as billing, reporting, fault detection and fault finding.

Members hold the responsibility for ensuring that their access links are appropriately sized and configured. When establishing new inter-Member links these will need to be documented and implemented bi-laterally between the two Members, in coordination with the OOG Coordinator.

For testing purposes, each Member can choose to either use an operational access or to establish a dedicated test access point.

3 REGULATORY REQUIREMENTS

3.1 ICAO Standards and Regulations

The CRV service shall support all functional and performance requirements for Aeronautical Fixed Service (AFS) as specified in ICAO Annex 10-Aeronautical Telecommunication, Volume III-Communication Systems, Part I-Digital Data Communication Systems and Part II-Voice Communication Systems.

The following are the sections that are applied to the CRV service:

1. Part I-Digital Data Communication Systems (AFTN/AMHS/AIDC)
    a. Chapter 3-Aeronautical Telecommunication Network (ATN)
    b. Chapter 8-Aeronautical Telecommunication Fixed Network (AFTN)
2. Part II-Voice Communication Systems.
    a. Aeronautical Speech Circuits (VoIP and legacy interface conversion to IP)

The CRV shall also support the functional and performance characteristics as specified in the following ICAO Documents:

1. 9896 ATN Manual for The ATN Using Internet Protocol Suite (IPS)
2. 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols

The CRV service planning, procurement and implementation shall be compliant against the ICAO Supplementary Provisions Doc 7030 and Regional Air Navigation Plan Doc 9673.

The safety case supporting the performance and safety requirements shall be conducted following ICAO Doc 9859 (Safety Management Manual).

3.2 ANSP Specific Requirements

Any specific requirement that is not specified in the document indicated in Section 3.1 above shall be applied strictly between the CRV service provider and respective ANSP through bi-lateral contract document.

4 NETWORK GROWTH AND TRANSITION

4.1 Initial Phase of Operation

The initial operation of the CRV service is expected to include all parties to the agreement, as defined in the Document of Agreement. This would include all Pioneer Parties as well as all Members which have elected to sign a contract with the Service Provider. Initially, it is likely that the CRV service shall be used to provide a platform for IP services that are either existing (currently using the point-to-point circuits which the CRV is intended to replace), or planned for the very near term (those services which would very likely have been hosted on point-to-point connections absent the benefit of the CRV). In general, the initial function of the CRV will be for the exchange of AMHS data between Members. However, as described below, it is envisioned that additional services and applications could be added to the CRV in the future.

4.2 Additional Participants in CRV

As described in the Document of Agreement, new States /Administrations of the ICAO Asia/Pacific Region may opt in to become Members of the CRV, as such need and intent arises. This process shall be conducted via the OOG Coordinator as described in the Document of Agreement.

4.3 Effect of CRV on Boundary Intermediate Systems (BIS) and Backbone Boundary Intermediate Systems (BBIS)

The current view of the Asia/Pacific ATN is of a network that is supported by a series of BIS and BBIS routers. These roles of these routers are as described in ICAO Document 9705. Currently, it is anticipated that there will be no change to this view of the Asia/Pacific ATN in the initial phase of operation of the CRV.

4.4 CRV Network Expansion

Network expansion of the CRV can be thought of in several ways, as described in the following sections.

4.4.1 Expansion of Membership

As described above and in the Document of Agreement, there may be new Members added as members of the CRV. This may be for purposes of AMHS connectivity or for other potential purposes as discussed below.

4.4.2 Expansion of Connectivity

While the initial connectivity within the CRV is expected to mirror current AFTN routing as per ICAO routing charts, the CRV may present opportunity for additional connectivity between members. While a point-to-point architecture (as used today) requires additional physical connections to be procured to add new connectivity between Members, the use of a common network (such as the CRV) provides the potential for any-to-any connectivity among its configured members. This may offer the opportunity for future expansion of connectivity between Members, thereby providing increased efficiency of routing and route diversion within the Region.

[Note: Such connectivity expansion induces a change of design and should be clearly reflected in the user requirements that the CRV Service Provider will have to meet.]

4.4.3 Expansion of Use and Applicability

While the initial use of the CRV is intended to be for AMHS, consideration should be given in the future to utilizing the network non-AMHS applications, as listed in paragraph 2.3. For Members, the carriage of such applications may induce new classes of service or requirements. Such change as an increase in bandwidth would be obtainable in a much simpler manner than for point-to-point connectivity. For example, applications such as System Wide Information Management (SWIM), once deployed to the Region, may be able to use the CRV, thereby eliminating the need for acquisition of new network resources.

[Note: Nevertheless such use expansion should be clearly reflected in the user requirements (technical requirements and change management requirements) that the CRV Service Provider will have to meet.]

REFERENCES

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ACSICG	Aeronautical Communication Services Implementation Coordination Group
ADS-B	Automatic Dependent Surveillance-Broadcast
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AMHS	Air Traffic Service Message Handling System
ANSP	Air Navigation Service Provider
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
Asia/Pac	Asia/Pacific
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
BBIS	Backbone Boundary Intermediate System
BIS	Boundary Intermediate System
CAR	Caribbean Region
ConOps	Concept of Operations
CRV	Common Regional Virtual Private Network
EUR	European Region
ICAO	International Civil Aviation Organization
IP	Internet Protocol
IPS	Internet Protocol Suite
NAT	Network Address Translation
OH	Operational Hazard
OOG	Operation Oversight Group
QoS	Quality of Service
RFI	Request for Information
RFP	Request for Proposal
SIP	Session Initiation Protocol
SME	Subject Matter Expert
ST	Sealed Tender
SWIM	System Wide Information Management
TF	Task Force
UC	Use Case
VoIP	Voice Over Internet Protocol
VPN	Virtual Private Network

Appendix A: list of operational hazards and threats relating to the CRV services

	Loss of	Unavailability of	Late delivery of	Out of sequence delivery of	Corruption of	Misdirection of	Denial of service for	Alteration of	Spoofing of
AMHS/FPL	OH-FPL1	OH-FPL2	OH-FPL3	OH-FPL4	OH-FPL5	OH-FPL6	OT-FPL1	OT-FPL2	OT-FPL3
AMHS/NOTAM	OH-NOTAM1	OH-NOTAM2	OH-NOTAM3	OH-NOTAM4	OH-NOTAM5	OH-NOTAM6	OT-NOTAM1	OT-NOTAM2	OT-NOTAM3
AMHS/MET or WXXM data	OH-MET1	OH-MET2	OH-MET3	OH-MET4	OH-MET5	OH-MET6	OT-MET1	OT-MET2	OT-MET3
Voice communications	OH-Voice1	OH-Voice2	OH-Voice3	OH-Voice4	OH-Voice5	OH-Voice6	OT-Voice1	OT-Voice2	OT-Voice3
Data Link communications	OH-DLK1	OH-DLK2	OH-DLK3	OH-DLK4	OH-DLK5	OH-DLK6	OT-DLK1	OT-DLK2	OT-DLK3
Surveillance data	OH-SUR1	OH-SUR2	OH-SUR3	OH-SUR4	OH-SUR5	OH-SUR6	OT-SUR1	OT-SUR2	OT-SUR3
AIDC data or FIXM data	OH-FPL1	OH-FPL2	OH-FPL3	OH-FPL4	OH-FPL5	OH-FPL6	OT-FPL1	OT-FPL2	OT-FPL3
AIM data or AIXM data	OH-AIM1	OH-AIM2	OH-AIM3	OH-AIM4	OH-AIM5	OH-AIM6	OT-AIM1	OT-AIM2	OT-AIM3
ATFM data	OH-ATFM1	OH-ATFM2	OH-ATFM3	OH-ATFM4	OH-ATFM5	OH-ATFM6	OT-ATFM1	OT-ATFM2	OT-ATFM3
Miscellaneous data (*)	OH-MISC1	OH-MISC2	OH-MISC3	OH-MISC4	OH-MISC5	OH-MISC6	OT-MISC1	OT-MISC2	OT-MISC3

OH Operational Hazard

OT Operational Threat

(*) Other data not pertaining to the categories above, or carried for TEST purpose only

OOG Operational Concept for Stage 2

Reviewed by CRV TF/2

Outline

- What is expected from OOG: Analysis of current provisions in DOA and CONOPS
- A 24/7 OOG Service monitoring?
- OOG: the global picture
- Staffing OOG
- Working with OOG
- Reporting to and by OOG

What is expected from OOG: Analysis of current provisions in DOA and CONOPS

OOG:
Current draft DOA provisions

Impl. APANPIRG strategy

DOA administration

CRV Membership

- Rules and Policies development/enforct
- Disputes

- Contract management
- Shared Costs allocation

- Plan changes
- Service Performance
- Safety case - Network Security

- **implementation and operation** stage shall be managed by the Operational Oversight Group (OOG) of the CRV network (DOA Article VI)
- OOG coordinator
  - General orientations (DOA Article II, *still to be drafted*)
  - focal point responsible for the **administration of DOA** during Stage 2 (DOA Article C-III)
  - handle all inquiries on and requests for **amendments to this Agreement** (DOA Article C-III); amendments submitted for review and approved by the OOG (DOA Article IX)
  - Countersign **CRV membership** (DOA Annex A-2)
  - If a Party defaults in this Agreement, the OOG has a right to **terminate the Party's membership** (DOA Article IX)
  - **Opt in** and **Opt out** (DOA Articles III and V)
  - **governing rules and regulations** of the OOG (DOA Article X)
  - Any **dispute** relating to the interpretation or application of this Agreement or its Annexes, which cannot be settled by negotiation shall be upon the request of any Party to the dispute, referred to the OOG through the OOG Coordinator for its recommendation for a possible solution to the dispute (DOA Article X)
  - **modifications to Individual Service Contracts** and its **subscription** shall be approved by the OOG through the OOG Coordinator (DOA Article IV)
  - All **costs** other than those linked to Individual Service Contract shall be **agreed by the OOG** prior to their commitments (DOA Annex C-1)
  - If **cost of modification** affects all Parties, OOG shall review the modification costs and modification works shall only be carried out upon approval by the OOG (DOA Article IV)
  - **modify its Network configuration** (DOA Article IV)
  - discuss the provision, administration, operation, maintenance, modification, upgrading and/or any other issues pertaining to the **Network and Services** (DOA Article C-IV)
  - **Performance standards** specified in the template or subsequently modified by the OOG (DOA Article IV)
  - **Interface between OOG and ICAO's regional groups and regional office** (DOA Article C-VI)
  - Interface between OOG and the Service Provider (DOA Article C-VI)

OOG:
Current draft Conops provisions

DOA administration

- Contract management
- Shared Costs allocation

- Plan changes
- Service Performance
- Safety case - Network Security

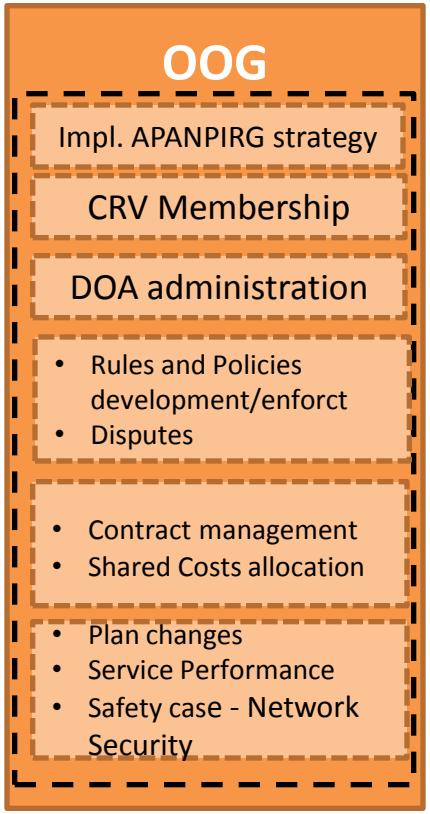
- Rules and Policies development/enforct
- Disputes

CONOPS Para 2.5.2.1.3 and 2.5.2.1.4

- focal point for Aeronautical Telecommunication Services Common Regional Virtual Private Network (CRV) and shall be responsible for the administration of the CRV. The OOG Coordinator shall also handle all inquiries and requests for amendments to this DOA after the contract is awarded
- Coordination and support to CRV candidates for signing the DOA
- Coordination and support to CRV Parties for signing their Individual Service Contract based on the Service Contract template (refer to the Document of Agreement) and in compliance with Service Contract Provisions
- Coordination and support of CRV Members for implementation and termination of Service Contracts
- Administration of the CRV operations according to the OOG policies and rules, in interface with the CRV Service Provider, the CRV Members and the ICAO Regional Office: fault management, configuration management, safety management, security management and performance management. As part of these activities, the safety case will be maintained vis-à-vis new applications or new connections.
- 2.7.4 Network Security
- 2.7.5 Capacity for Growth and Expansion
- 2.7.6 Network Monitoring
- 2.7.7 Reporting
- 2.7.8 Service Notifications
- 2.7.9 Network Design and IP Addressing
- 2.8 Support environment
- Administration of the DOA after the contract awarding: handling of amendments to DOA (refer to DOA), handling of disputes (refer to DOA).

OOG: main functions

After analysis of draft DOA and draft CONOPS, the functions expected from OOG can be summarized:

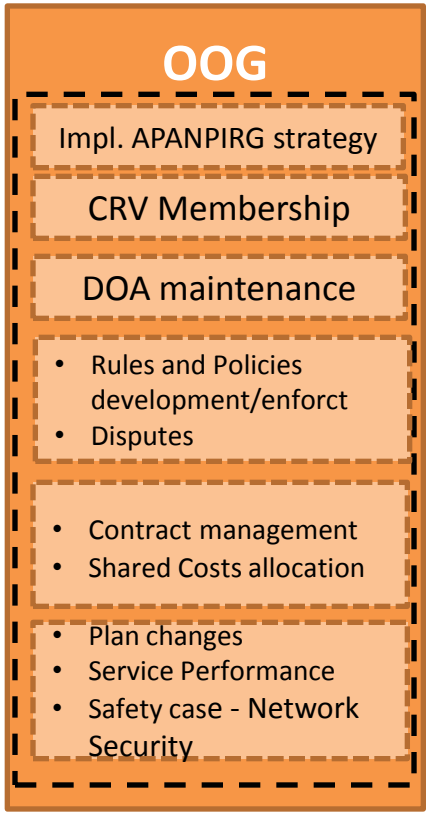


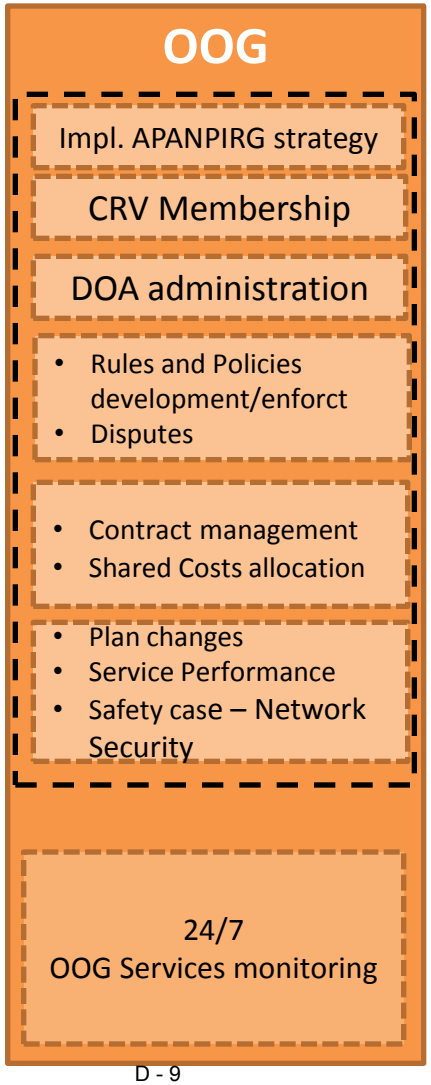
A 24/7 OOG Service monitoring?

A 24/7 OOG Service monitoring?

- Should APAC region entrust all its daily operations to the network service provider?
- PENS feedback
  - MINS and PENS-1 contracts:
    - daily operations including a 24/7 service desk were fully entrusted to the network service providers
  - Lack of effectiveness and ATM knowledge
    - in some instances not even dedicated to the service or the user community
- Optional “OOG Services monitoring”
  - Would act as a 24/7 OOG entity coordinating CRV Members
  - 2 possibilities for staffing: roster/permanent staff
  - If cash flows were involved (permanent staff), they would be handled through DOA Annex C-1

A 24/7 OOG Service monitoring?





2 scenarios possible: without and with OOG Services monitoring

Comparison

	No 24/7 OOG Service monitoring	24/7 OOG Service monitoring
Support	• Possibly poor knowledge of ATM services (voice, AIDC, etc) by CRV Service Provider helpdesk => poorer effectiveness of the daily support	• Knowledge of ATM services (voice, AIDC, etc) => good effectiveness of the daily support
Safety	• Risk of poorer escalation process by CRV Service Provider due to poor knowledge of ATM services	• Efficient escalation process based on severity of event due to poor knowledge of ATM services
Security	• Risk of poorer escalation process by CRV Service Provider	• Efficient escalation process
Reporting	• CRV Service Prov. reporting	• CRV Service Prov. reporting • Independent reporting
Troubleshooting	• All POC deal directly with the CRV Service Provider, no confusion possible. • Possible interference between CRV Members and CRV Service Prov. (multiple notifications of the same pb etc)	• Better coordination of CRV Members by OOG but.. • 2 technical advices on diagnostic/solution • One more actor (OOG Service monitoring) that might introduce complexity
Reactivity		• Better for notification: notification of problems to the CRV Service Provider is coordinated
Cost	• Cost of 24/7 desk included in the service	• Cost of 24/7 desk included in the service • Plus shared cost of 24/7 OOG Serv. Mon. • Could be seen as a duplicated effort

Conclusion (1/2)

- 24/7 OOG Service monitoring: better service, more complex, more expensive
  - PENS switches to this model for their 3rd generation
- Decision difficult to make before any implementation
- Proposal:
  - Start without 24/7 OOG Service monitoring
  - Ask a dedicated helpdesk in the 24/7 Network Operation Center
    - With knowledge of the CRV network and basic CNS/ATM skills
    - Handling priority
  - Monitor support effectiveness
  - Switch to OOG Services monitoring if not satisfactory

Decision agreed by CRV TF/2 meeting, 12 May 2014

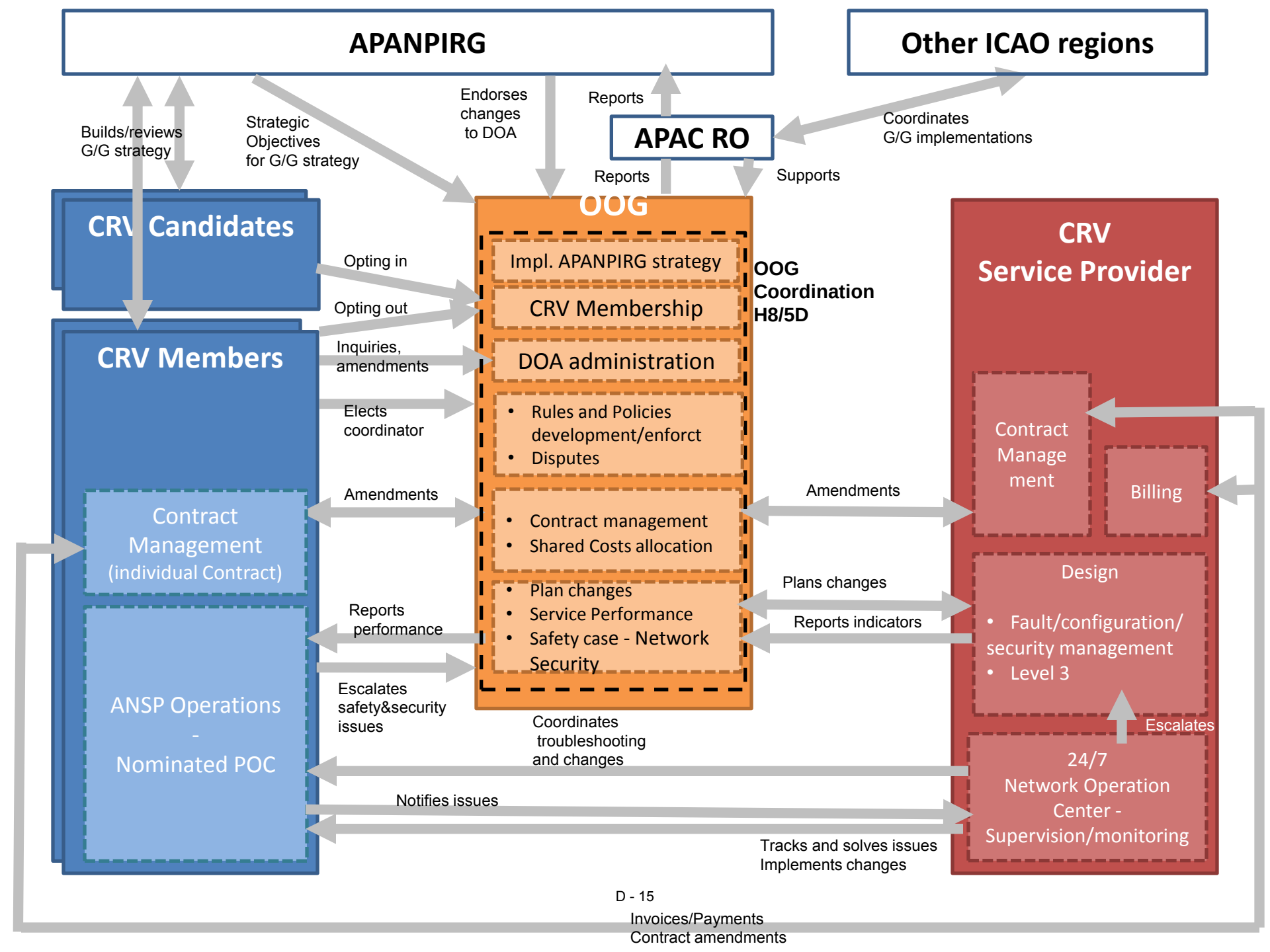
Conclusion(2/2)

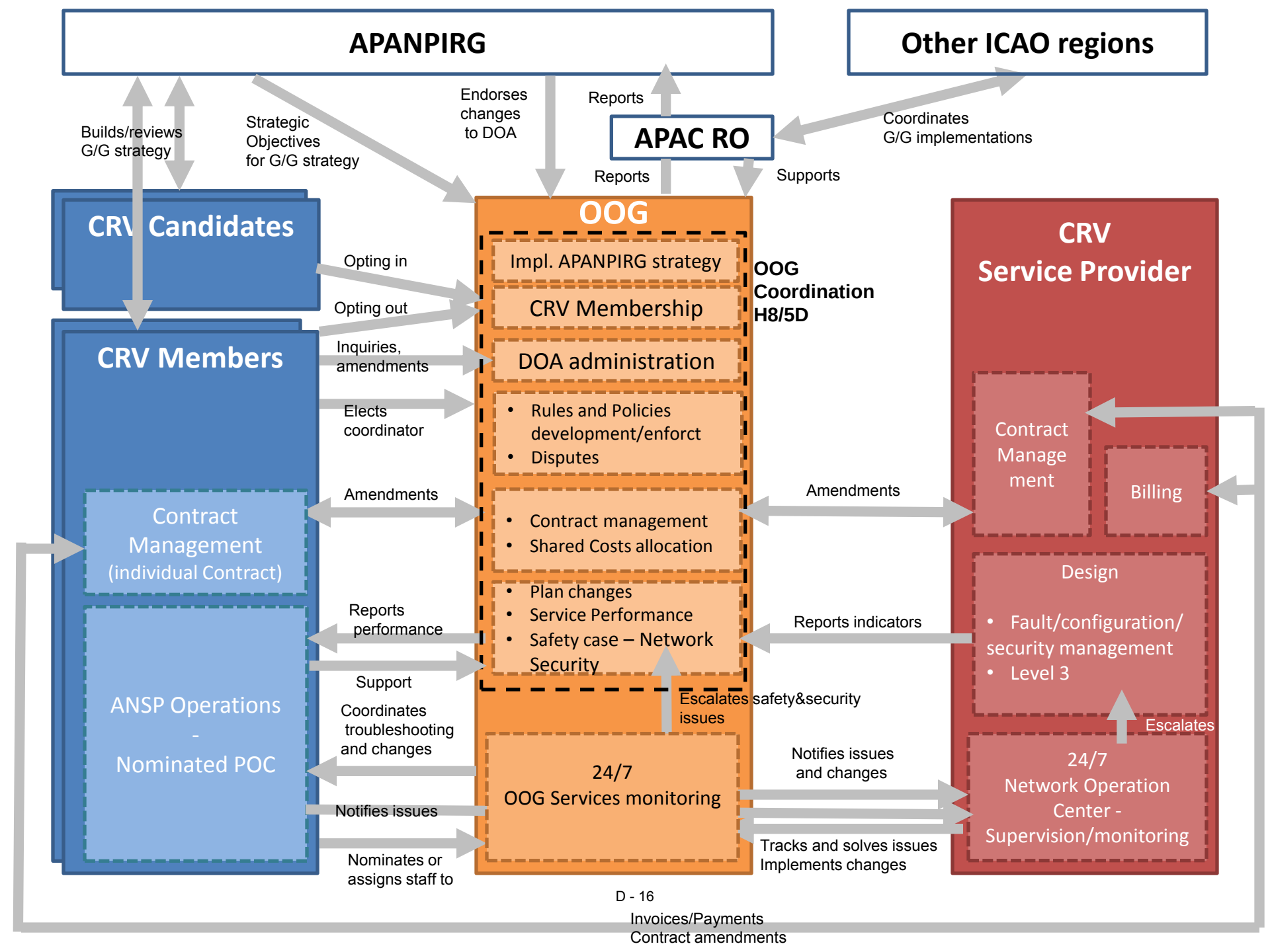
- Mechanisms in DOA and Sealed Tender have to enable the switching to OOG Services monitoring if needed
  - DOA
    - Ability to share and fund costs if permanent staff
    - Delegates the roster to OOG coordinator if roster
  - Sealed Tender
    - Dedicated helpdesk in the 24/7 Network Operation Center with knowledge of the CRV configuration and basic CNS/ATM skills
    - Manage priority of intervention (= high priority granted for strongest impact on OPS/safety/security)
    - Costs of Dedicated helpdesk should be isolated in the contract
    - Reversibility of outsourcing
    - Monitor effectiveness of Dedicated helpdesk: set targets and measure their achievement by indicators and metrics

OOG: the global picture

Players

- OOG
- CRV Candidates
- CRV Members
- CRV Service Provider
- ICAO
  - APANPIRG
  - ICAO APAC RO
  - Other regions


APANPIRG
Other ICAO regions
Builds/reviews G/G strategy
Strategic Objectives for G/G strategy
Endorses changes to DOA
Reports
APAC RO
Coordinates G/G implementations
Reports
Supports
CRV Candidates
OOG
Impl. APANPIRG strategy
CRV Membership
DOA administration
• Rules and Policies development/enforct
• Disputes
• Contract management
• Shared Costs allocation
• Plan changes
• Service Performance
• Safety case - Network Security
OOG Coordination H8/5D
CRV Service Provider
Opting in
Opting out
Inquiries, amendments
Elects coordinator
CRV Members
Contract Management (individual Contract)
Amendments
Amendments
Contract Management
Billing
Design
• Fault/configuration/ security management
• Level 3
Plans changes
Reports indicators
Reports performance
Escalates safety&security issues
ANSP Operations - Nominated POC
Coordinates troubleshooting and changes
Escalates
24/7 Network Operation Center - Supervision/monitoring
Notifies issues
Tracks and solves issues
Implements changes
Invoices/Payments
Contract amendments


APANPIRG
Other ICAO regions
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Strategic Objectives for G/G strategy
Endorses changes to DOA
Reports
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OOG Coordination H8/5D
CRV Service Provider
Opting in
Opting out
Inquiries, amendments
Elects coordinator
Amendments
Amendments
Contract Management (individual Contract)
Contract Manage ment
Billing
Design
• Fault/configuration/ security management
• Level 3
Reports performance
Support
Reports indicators
Escalates safety&security issues
Escalates
Coordinates troubleshooting and changes
ANSP Operations - Nominated POC
24/7 OOG Services monitoring
Notifies issues and changes
24/7 Network Operation Center - Supervision/monitoring
Notifies issues
Tracks and solves issues
Implements changes
Nominates or assigns staff to
Invoices/Payments
Contract amendments

Staffing OOG

Staffing the OOG structure

- OOG Coordination
  - Tasks
    - Office hours, Monday-Friday
    - Implements strategy as adopted by APANPIRG on new services and ground-ground communications
    - Manages OOG membership (opt in/opt out)
    - Maintains DOA (coordinates amendments and signing)
    - Establishes OOG rules and policies (including disputes) and enforces them
    - Manages the Contract Framework in interface with CRV Service Provider and CRV Members
    - Plan changes with CRV Service Provider and CRV Members
    - Builds the performance reporting to ICAO and CRV Members based on inputs from the CRV Service Provider (see slide about indicators)
    - Maintains the safety case and monitors associated indicators
    - Intervenes in case of escalation of problems by OOG Services monitoring or by CRV Members (= when safety or security are probably impacted)
    - Manages the rostering of 24/7 OOG Services monitoring (only for OOG Services monitoring Scenario 1, network of POC)
  - Solution proposed
    - Coordinator: 1 Officer, full time, Monday-Friday
    - Rotated and appointed by the CRV Parties on an annual basis, in accordance to the governing rules and regulations of OOG (DOA, Article C-III)
    - Meetings/teleconferences of representatives from the Parties (OOG Group) according to the Work Program (Article C IV): provision, administration, operation, maintenance, modification, upgrading and/or any other issues pertaining to the Network and Services

Staffing the OOG structure

- OOG Services monitoring
  - Option to be confirmed (not in the CONOPS so far)
  - Tasks
    - 24h coordination unit for any network issue involving more than 1 Member
    - Coordinates the notification, troubleshooting and closure of issues with the CRV service provider and all involved CRV Members
    - Escalates the issue to OOG coordinator when safety or security are probably impacted
    - Implements planned changes with the CRV service provider and all involved CRV Members
    - Maintains an action table for OOG Coordinator of all issues and their follow-up
  - Solution proposed
    - 1 position, H24, 7 days
    - 2 scenarios
      - A network of POC: each OOG member nominates a H24 POC, who is responsible to coordinate OOG operations with its own ANSP operations. The 24/7 OOG services monitoring is delivered through the cooperation of POC, under the supervision of a designated POC
        - » Rostering: OOG coordinator designates who among the POC is in charge of the OOG Services Monitoring
        - » No cash flow, fair effort sharing among States is ensured by a rotating roster
      - Permanent staffs : The 24/7 OOG services monitoring is delivered through permanent staffs
        - » Funding required and shared by all CRV Members under DOA cost allocation: could be national experts or experts recruited by TCB
        - » Or permanent staffs assigned by CRV Members based on a rotation
        - » Cost 700US$*3*365= USD770k per year, to be divided among CRV Members

Working with OOG

Working with OOG

- States (CRV Members)
  - Contributes to OOG through their representative (meetings, teleconferences)
  - Manage their Individual Service Contract in coordination with OOG
  - Pay their invoices to the CRV Service Provider
  - Elect the CRV Coordinator
  - Propose DOA amendments if needed
  - Nominate/assign staff to OOG Service monitoring (if option confirmed)
  - Nominate CRV POC
- States POC
  - Tasks
    - Coordinates 24/7 the notification, troubleshooting and closure of issues with the CRV service provider
    - Escalate the issue to OOG coordinator when safety or security are probably impacted
    - Coordinates the planning of changes with the OOG coordinator and CRV service provider
    - Implements changes with the CRV service provider
    - Generate timely report to OOG Coordinator of all arising issue and follow-up
  - Solution suggested
    - States assign the CRV tasks to their OPS staff

Working with OOG

- CRV Service Provider
  - Provides network services as stipulated in the contracts
  - Supervises network and monitors operations
  - Tracks and solves issues (24/7 support)
  - Reports monthly performance to the OOG Coordinator
  - Implements changes
- ICAO
  - OOG coordinator reports on progress, performance, safety, security to APANPIRG through ICAO APAC RO
  - ICAO APAC RO provides support to OOG

Reporting to and by OOG

Reporting by CRV Service Provider

- Computed over a reference period (monthly)
- OOG will get from the CRV Service provider:
  - Service use (% average load, % peak load)
  - Technical Service levels indicators:
    - availability for each user for a given application
    - round trip delay for a given application
    - jitter for a given application
    - IP packet loss for a given application
    - Mean Opinion Score (only for voice communications)
    - detected corruption of IP packets
  - Incidents and service disruptions: application(s) and user(s) concerned, time, gravity, duration
  - Effectiveness of Dedicated helpdesk
    - Number of issues handled over the month
    - Min/average/max time for diagnostic over the month
    - Min/average/max time for resolution over the month
    - Min/average/max time for implementing a change over the month
    - …

Applications:

- AMHS (FPL/NOTAM/MET)
- voice communications
- Data Link communications
- surveillance data
- AIDC data
- AIM data
- ATFM data
- SWIM (FIXM/AIXM/WXXM) data
- other

Reporting by OOG

- OOG will report to Member States and ICAO on:
  - Progress: status of membership, number of applications migrated, interregional connectivity
  - DOA: issues, amendments proposed for endorsement
  - Changes: planned/implemented
  - Performance: availability of applications, incidents and service disruptions by application
  - Safety: safety indicators set by the preliminary safety case and such as redundancy and single points of failure, number of safety events over the reference period
  - Security: number of security events over the reference period
  - Contract management: issues, amendments
  - Roster (if applicable)

- Questions

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Common Regional Virtual Private Network (CRV) Of Asia/Pacific

Air Navigation Planning and implementation Regional Group

(APANPIRG)

Cost Benefit Analysis (First iteration)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA-PACIFIC OFFICE

Document Change Record

Version Number	Date	Reason for Change	Sections Affected
1	29 April 2014	Creation of draft CBA for CRV TF/2 and ACSICG/1 meetings	

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1. Introduction

The First Meeting of the CRV (Common Regional Virtual Private Network) Task Force elaborated a work plan for carrying out the study mandated by the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) under Decision 24/32 Common Regional Virtual Private Network (VPN) Task Force.

It was recognized that such a service could be considered as a multinational service, as per ICAO Document ASIA/PAC BASIC ANP Doc9673, and that such approach would require a cost benefit analysis to make sure that the project was cost efficient and beneficial for both developing and advanced States. The task was initiated to collect data from various member states as per Appendix 1 template in order to better define the recurring costs and problems associated with the current configurations. Every State or Administration of the Asia/Pacific Region was invited to reply to this Survey to ICAO Asia and Pacific Office (ICAO APAC Survey).

Fifteen organizations including one ANSP and fourteen States, have positively contributed through the ICAO APAC Survey, as per Appendix 2. This Cost Benefit Analysis (CBA) document analyzes the reports based on the Survey of these States and evaluates options that will help APANPIRG and the member states to take a decision for joining the CRV network and plan their budget accordingly.

1.1. Current Status

Currently, Aeronautical Fixed Telecommunication Network (AFTN) and AMHS services in the Asia/Pacific Region are operated over point-to-point international private lines (IPL). This network configuration exhibits a number of limitations, including (but not limited to):

- Half circuit arrangement between States is increasingly difficult to order and time consuming;
- Circuit upgrades between states is also impacted due to variable pricing and bandwidth availability of the half circuit at each State;
- Dynamic routing is not supported due to limited bandwidth and no central administration of the network;
- Incompatible network protocol do not support Extended Service as specified in ‘Manual on Detailed Technical Specifications for the Aeronautical

Telecommunication Network (ATN) using ISO/OSI Standards and Protocols (ICAO Doc9880)';

- New features enhancement as recommended by ICAO 12th Air Navigation Conference such as System Wide Information Management (SWIM) is not supported;
- Network security measures cannot be implemented which leads many States to implement their own security measures and policy adding to overall costs; and
- Different budget cycles and priorities between States make the synchronization of upgrades difficult and in turn limit the seamless distribution of Aeronautical Fixed Service (AFS) data.

1.2. Brief introduction to CRV

In an attempt to resolve these issues, the CRV Task Force was formally established in accordance with APANPIRG Decision (24/32), (Bangkok, Thailand, 24-26 June 2013).

It was decided that a dedicated, common network operated by a Communication service provider is a viable approach to be studied to replace the current configuration. Common networks have successfully been deployed in other ICAO regions (e.g. PENS in the EUR Region and MEVA in the CAR Region). Therefore, the Meeting adopted the following decision:

Decision 24/32 - Common Regional Virtual Private Network (VPN) Task Force

> That, a Task Force with Subject Matter Experts (SME) be established to study the virtual private network and develop a detailed proposal by 2016. The Task Force reports the outcome of its study to APANPIRG through ACSICG and CNS SG.

2. Scenario Analysis

The CBA document has studied two scenarios: introducing and not introducing a common aeronautical regional network in the Asia/Pacific region. Cost and benefit analysis was performed for the two scenarios.

2.1. Scenario 1 – Do Nothing

This chapter considers the case of not introducing the CRV.

2.1.1. Benefit Analysis

2.1.1.1. Summarized cost of current link infrastructure from ICAO APAC Survey

From ICAO APAC Survey and analyses on the data provides following

Type of circuits in use:

There are three types of circuits currently used by states, 'Voice only', 'Data only' and 'Multiplexed Data + Voice'. Summarizing all usage types, the total number of circuits are 181. Distribution of usage is 'Data only': 43%, 'Voice only': 43% and 'Multiplexed Data+ Voice': 14%. Usage of Multiplexed 'Voice' and 'Data' remains quite low at 14%, indicating that separate circuits are provided for data and voice in most cases.

Bandwidth in use:

Currently circuits with 64 Kbps bandwidth accounts for the highest number of circuits in use and amount to 39% of all the circuits in use in Asia/Pacific region. 9.6kbps accounts for 12%. Furthermore the slowest bandwidth used is 2.4kbps and highest bandwidth is 2Mbps. There are 8 lines of 2Mbps.

Ratio of Landline to Satellite circuits:

Regarding the use of connection between various states, the ratio of Land Line is 85%, and the ratio of Satellite is quite low at 15%.

In accordance with the result from ICAO APAC Survey, the cost of the communication infrastructure that is currently connected is summarized in the table below:

Figure 1: *Result of ICAO APAC Survey*

	For all Communications	For voice only	For data only	For multiplexed data + voice
Total monthly cost of communications for all States (in US$)	415,647	185,009	162,498	68,140
Total yearly cost of communications for all States (in US$)	4,987,764	2,220,110	1,949,976	817,678
Average yearly cost by State (in US$)	332,518	148,007	129,998	54,512
Average kbps cost (in US$)	98.7			

Caveats:

- Number of States/Administrations in the Survey is 15 organizations (States/ANSPs).
- All currencies have been converted into US$ based on the March 14 rate

- Costs are a minimal estimate since costs as per use are not included

It may be noted that the 15 organizations (States/ANSPs) that were reported by ICAO APAC Survey are spending a total US$ 5 million per year for international aeronautical ground-to-ground communications (voice and data).

2.1.1.2. Negative impact from doing nothing (can be considered as cost)

Negative impact of non-introduction of the CRV by states based on available data is as follows:

2.1.1.2.1. Inability to support GANP technology roadmap

SWIM is an integral part of the Global Air Navigation Plan (GANP) and relates to a number of Aviation System Block Upgrades (ASBUs) modules. It will offer SWIM technical services based as much as possible on mainstream information technologies (IT) technologies. It will preferably be based on commercial off-the-shelf (COTS) products and services. Typically dedicated, secured IP networks will be applied to the underlying basic ground/ground connectivity. Also a dedicated IP network is an explicit requirement of the technology roadmap to enable SWIM and Voice over IP for inter‑centre voice ATM communications. In Asia/Pacific region, IP network that connects between each States is not currently implemented. The CRV if not implemented will be a major stumbling block in realizing the future plan of ICAO.

2.1.1.2.2. Difficult to expand / manage ground-ground communications (lack of scalability and manageability)

The management - and specifically the upgrade - of the present IPL which are based on half circuit agreements between states is becoming increasingly difficult. Setting up and maintaining the circuits require regular coordination between telecommunication service providers and are difficult to manage. The actual implementation of the circuit requires a long lead time as each State has a different contract procedure and is required to pay for its own half circuit thus making it increasingly difficult to order the circuits in several States. Also, there is no common point for management of faults thus requiring each state to individually research into the cause of a circuit failure and thus it takes a lot of time to isolate the fault. Furthermore, whenever an upgrade of circuit is required due to increased bandwidth requirements, the service provider is not able to upgrade and mostly a new

circuit is required to be established to cater for higher bandwidth.

2.1.1.2.3. No common interface – different interfaces due to different technologies used such as X.25, VSAT, etc.

The existing regional network has been built up with large number of IPLs between individual States. These circuits use various underlying protocols and physical interfaces such as X.25, X25/IP conversion, or voice/data MUX, making it increasingly difficult to manage for the technical teams. In addition, many interfaces, which were designed to support point-to-point or application-to-application exchanges, have limited flexibility to accommodate new users, additional systems, new content or changed formats use.

2.1.1.2.4. Obsolescence

According to the ICAO APAC Survey, the maintenance of low-speed IPL by the telecommunication service provider is becoming increasingly difficult. The legacy technologies like X.25 or PES/TES VSAT etc. are almost obsolete, requiring lot of effort and increasing costs to maintain and sustain the network. The service providers are therefore reluctant to maintain the legacy technologies. X.25 technology has been taken over by IP based/ MPLS networks which are more efficient and provide higher bandwidths at lower costs. Also, the Voice/Data Multiplexer has become difficult to maintain as the industry has moved to Voice over Internet Protocol (VoIP) standard. In some cases, spare parts can no longer be obtained from industry.

2.1.2. Cost Analysis

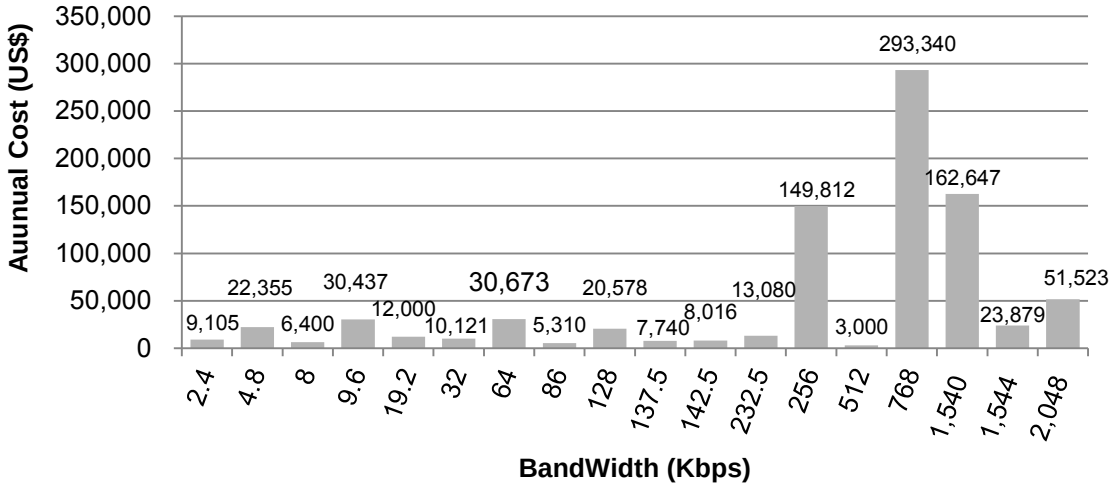
2.1.2.1. Current predictable cost

Currently, the contract method of IPLs is based on half circuit arrangement: the cost is shared by two States for establishing one circuit. In view of difficulty in analyzing each line approach of total cost and average connecting cost in the Asia/Pacific region has been adopted accordance with the purpose.

The analysis of the data based on annual cost per circuit for each bandwidth connection reveals that 64Kbps accounts for 39% of the total circuits and the protocol mainly used is X.25 protocol, and the average cost per circuit is US$ 30,673.

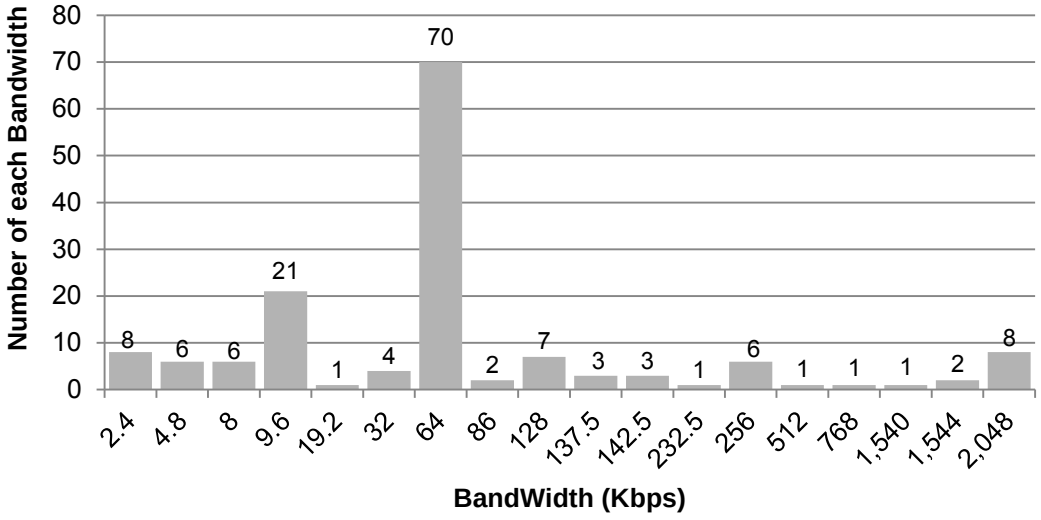
The reason of usage of 64Kbps being so widespread is the use of underlying X.25 protocol which supports 64Kbps as a maximum bandwidth. The cost worked out is per circuit, so total cost for each State depends on the number of connections.

Figure 2: *Annual Cost per Line of each Bandwidth*



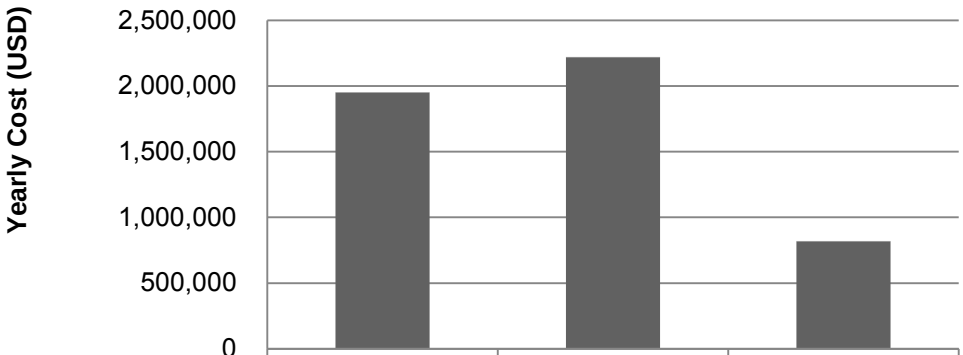
In the future, the need for internet protocol suite (IPS) would increase, requiring faster line speeds. As per the plans AMHS will be used to exchange weather information (WXXM) defined by the XML format, and thus the lines for AMHS will be expected to use IPS for accommodating increased flow of data through XML format.

Figure 3: *The Number of lines per bandwidth*



Furthermore, it may be seen that bandwidth requirements/ new circuits will increase in the short-term to cater for the exchange for AIDC messages with adjacent States.

Figure 4: *Annual Cost of Type*

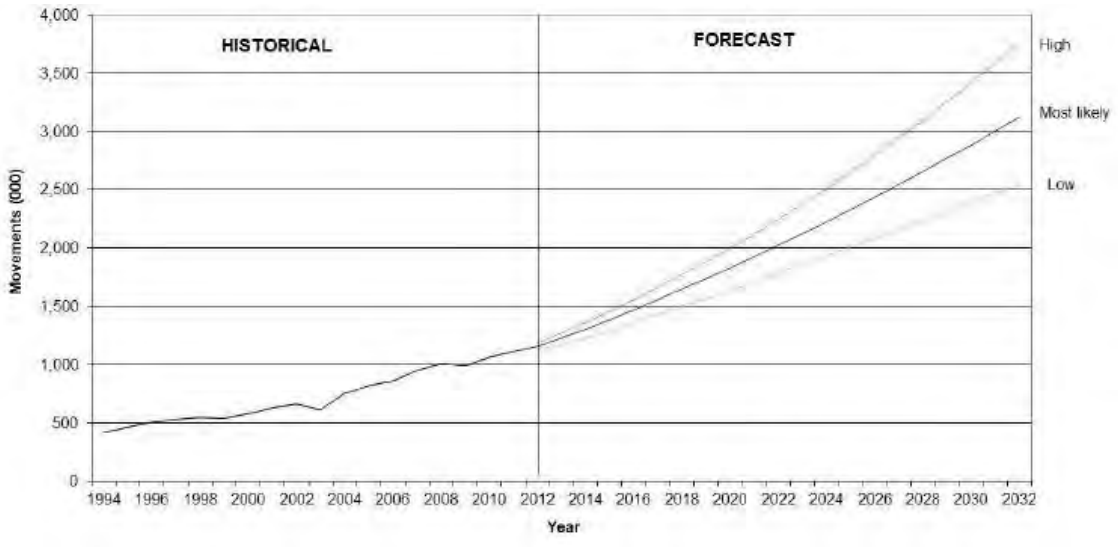


	Data	voice	Data+Voice
Lines	78	77	26
Yearly Cost (USD)	1,949,976	2,220,110	817,678

Also as per ICAO APAC Survey, MUX for Voice and Data cannot be maintained by telecommunication service providers in near future, so it is imperative to look for alternative method or install individual circuits for different services.

In the medium to long term perspective, strong growth of demand is expected toward 2032. The demand for aircraft movement of the Intra-Asia/Pacific is shown in the figure 5 below. To cater to these demands, States will need to achieve the ASBUs in GANP (e.g. SWIM). Therefore, the wider bandwidths supported by a secure IP/ MPLS network will be required by existing and new international aeronautical communication services.

Figure 5: *Intra-Asia/Pacific Aircraft Movement Forecast*



Forecasts of Transpacific and Intra-Asia/Pacific Traffic to the Year 2032

Consequently, it may be seen that the present method of constructing the network by IPLs to meet the existing requirements as listed above, the cost to maintain the circuits will continue to upwards from yearly US$ 5 million presently being used by 15 States in ICAO APAC Survey.

2.2. Scenario 2 – Move to CRV

This chapter considers the case of introducing the CRV network in the Asia/Pacific region.

2.2.1. Benefit Analysis

2.2.1.1. Support Global Air Navigation Plan (GANP) roadmap

'ICAO's Global Air Navigation Plan (GANP) (ICAO Doc 9750)' has introduced the Aviation System Block Upgrade (ASBUs) framework and roadmaps in 2013. As a follow-up to APANPIRG/24 Conclusion 24/2, regarding the establishment of Regional Priorities and Targets, and referring to the ICAO APAC Seamless ATM plan v1.0, the initial regional priorities endorsed by APANPIRG/25 in September 2014 should be:

- ATFM/A-CDM (B0-NOPS);
- AIM (B0-DATM);
- AIDC (B0-FICE);
- FUA (B0-FRTO);
- Surveillance (B0-ASUR); and
- Data-link ADS-C and CPDLC (B0-TBO).

To enable specifically AIDC (B0--FICE) in the initial regional priorities, implementation of a common network internationally is essentially required. According to the ICAO APAC Survey, currently, there are many problems, such as described in 1.1 Current Status to the introduction of IPLs. For catering to the future services, the communication infrastructure is required in an environment that can take advantage of IT technology.

A dedicated, common regional virtual private network operated by a communication service provider will be of utmost importance in the Asia/Pacific region, in order to promote the implementation of the GANP roadmap and is under consideration to replace the current configuration. Common networks had successfully been deployed in some other ICAO regions (e.g. PENS in the EUR Region and MEVA in the CAR Region).

2.2.1.2. CRV technology is the enabler for future services:

The CRV network shall be established by using the IP based virtual private network (IP-VPN) service, which will be a closed private IP network via the access line.

Specific service level agreement (SLA) will be put in place between States and a common service provider to guarantee the speed of the circuit, the quality of service (QoS) and other performance and quality parameters.

The usage fee shall be determined based on bandwidth usage or other similar criteria as agreed upon or quoted by a common service provider and is expected to be lower than the one of existing IPL.

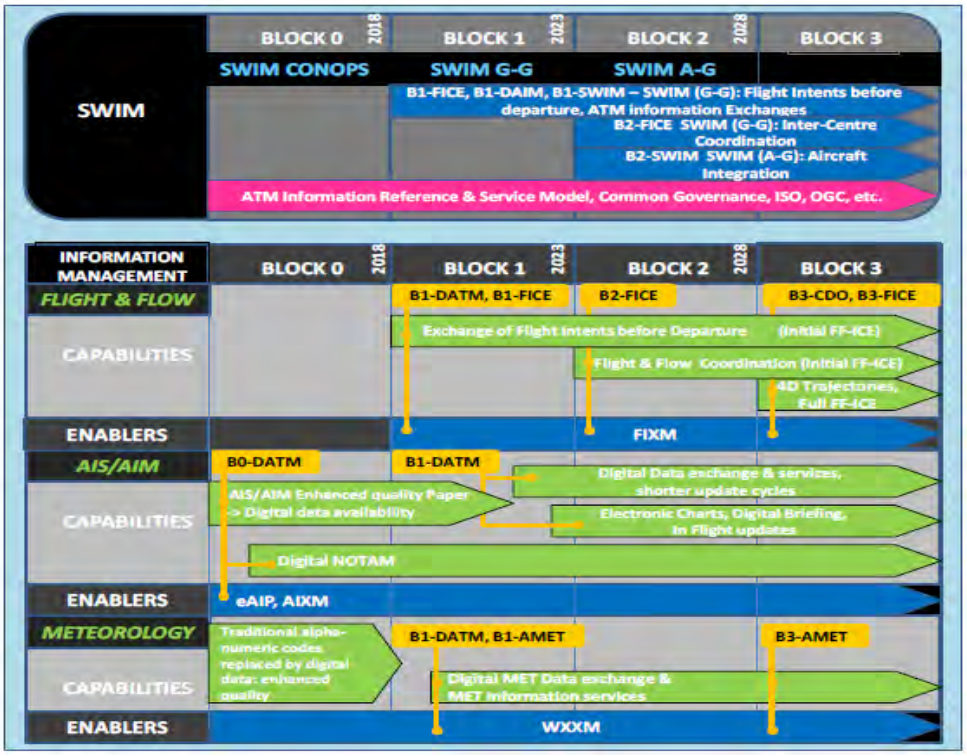
As compared to IPL services, such as wide-area Ethernet or conventional Frame Relay, the IP-VPN is advantageous in terms of low running cost, and easy to construct with a flexible network configuration. In addition, priority control and bandwidth control is also feasible, thereby allowing high speed and large capacity of data flow enabling voice communication as well using VoIP.

Therefore, the CRV is sufficient to meet the technical requirements of demands on future concepts, as applications may be developed using IT technology according to the future concepts.

2.2.1.2.1. SWIM

The SWIM is mainly contained in the ASBUs B1-SWIM and B2-SWIM. In addition, the modules relating to service improvement through digital aeronautical information management and integration (B0-DATM & B1-DATM) as well as modules for improving operational performance through FF-ICE (B1-FICE, B2-FICE, and B3-FICE) are important early components of overall SWIM.

Figure 6: *Roadmap of Global Air Navigation Plan*



As an IP network based on IP-VPN, the CRV network will be the future communication infrastructure to support the SWIM.

2.2.1.2.2. ASBUs – B0-FICE

The ICAO, B0-FICE in ASBUs is required to be implemented during the period Block0 (2013 ~ 2018).

Figure 7: *Summary of Module B0-FICE in ASBUs*

B0-FICE	
Item	Increased Interoperability Efficiency and Capacity through Ground – Ground Integration
Summary	Supports the coordination of ground – ground data communication between ATSU based on ATS Inter-facility Data Communication (AIDC) defined by ICAO Document 9694.
Comment	Increased Interoperability, Efficiency and Capacity though Ground – Ground Integration Improves coordination between air traffic service units (ATSUs) by using ATS inter-facility data communication (AIDC) defined by ICAO's Manual of Air Traffic Services Data Link Applications (Doc9694). The transfer of communication in a data link environment improves the efficiency of this process, particularly for oceanic ATSUs.

It is set as the target in the short term. Therefore, the reduction in lead time to introduce the procedures will greatly contribute to the achievement. The whole process to implement AIDC with adjacent FIR can be expedited by implementing the CRV instead of establishing IPL which will be expensive and difficult to manage.

2.2.1.3. Manageability

The CRV will provide a seamless and homogeneous service in view of better management and service level agreements that will be in place between individual states and the communication service provider. Service provider will be in a better position to manage, report and restore the circuits in case of failure. In addition, dynamic increase in bandwidth of the circuits and network will be possible as per the requirement on short notice. The network will be using the underlying IP protocol and thus COTS products/applications will be easily available. The system of monitoring and the maintenance by service provider will be built in 365 days 24 hours. Fault detection will be easy and fault status and reporting can be determined by point of contact quickly and fault section and report generated end-to-end. Monitoring of communication equipment and the circuits shall be possible remotely (e.g. Ping Monitoring, CPU utilization, Memory usage/rate, Traffic (in/out)). In

addition, the country that connects to the CRV will be able to ensure the monitoring environment using the WEB.

2.2.2. Cost Analysis

2.2.2.1. Initial One-off deployment costs

To assess the one-off deployment costs, a survey was carried out on several IP-VPN service providers (KDDI, NTT communications). The results of the survey is as follows.

(1) The one-off deployment does not depend on the bandwidth.

(2) If 21 locations in the 15 States of ICAO APAC Survey introduce IP-VPN, the estimated amounts would be:

A) Large difference occurs in the estimated amount by the situation of the communications infrastructure in each State.

B) From US$ 600 ~ to: US$ 50,000.

Based on the information above, following a conservative approach, the initial one-off deployment costs of introducing the CRV would be assumed to be as follows:

(1) The one-off deployment costs should be assumed that it will be introduced as the most expensive case to communication facility of 21 locations.

21(locations) x 50,000(US$) = US$ 1,050,000

(2) The costs necessary to TCB for CRV introduction is estimated at: US$ 180,000

(3) Adapting the current equipment owned by States to interface with the CRV network is assessed as not needed, because the common service provide will deploy and maintain all necessary equipment.

(4) The costs for States representatives to participate in the CRV task force are estimated as follows:

15(States) x 5,000(US$) x 10(times) = US$ 750,000

(5) It is required 100 days until operation after application for IP-VPN. In addition, Project management, Design, Safety, Installation and Tests cost for the creation of the network for 15 States (21 locations) for States would be assumed to be US $ 700 per day.

21(locations) x 100(Days) x 700(US $) = US$ 1,470,000

As a result, the initial one-off deployment cost conservative estimative for 15 States (21 locations) amounts to US$ 3,450,000.

2.2.2.2. Total cost of ownership over 10 years

To compare the cost of the two scenarios on a fair basis, the cost of moving to the CRV has to be estimated over the CRV lifecycle, 10 years (initial 5 years contract plus 5 years extension), including the initial one-off deployment costs to implement the CRV network.

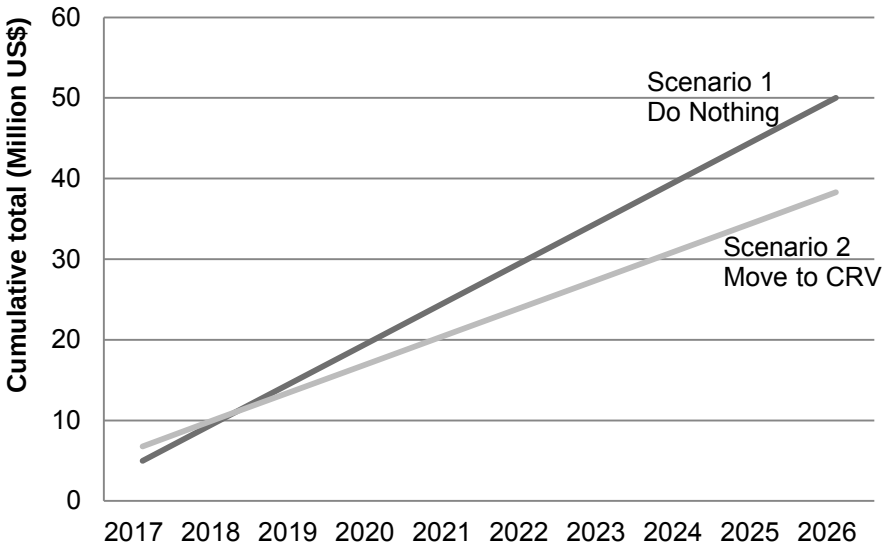
According to *Proposed Asia/Pacific Internet Protocol (IP) Virtual Private Network (VPN) (APANPIRG/24 - WP/20*, using an IP-VPN could result in 30% cost saving and significant additional bandwidth when compared to point-to-point circuits.

The initial one-off deployment costs could be recovered in one or two years, even if it is assumed that the introduction of IP-VPN would only encompass all connected points that were reported in the ICAO APAC Survey (conservative approach).

Figure 8: *Total cost of ownership over 10 years for 15 States, for the 2 scenarios*

		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Scenario 1 Do Nothing	One-off costs (15 States)	0	0	0	0	0	0	0	0	0	0
	Yearly service costs (extrapolated), (15 States)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Cumulative total	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
Scenario 2 Move to CRV	One-off costs (15 States)	3.45	0	0	0	0	0	0	0	0	0
	Yearly service costs (extrapolated), (15 States)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
	Cumulative total	6.79	10.29	13.79	17.29	20.79	24.29	27.79	31.29	34.79	38.29

Figure 9: *Compared total cost of ownership over 10 years for 15 States, for the 2 scenarios*



In reality it is foreseeable that the number of connections will have to be increased in both scenarios as more States opt in.

If the number of connecting points is increased, the IPL network in Scenario 1will need to be further meshed and the service costs will increase accordingly. In the Scenario 2, the IP-VPN network is not sensitive to the increase in the number of connecting points, which will augment the distance between the 2 scenarios, in favour of Scenario 2.

For example, for an IP network of 1Mbytes with 5 connecting points, the cost comparison between IPL and IP-VPN would be estimated by the following modeling approach:

- Current IPL line is composed of domestic access lines and international IPL line. The costs of the global IPL line is assumed to be 100, in addition, total costs of access lines to the end of both on the global IPL is assumed to be 100. In this case, it becomes 200 to carry out 1 line.

- Regarding the IP-VPN access, since the cost of IP-VPN becomes at least 30% reduction compared with the cost of international IPL line, the cost of the global IP-VPN is assumed to be 70. Since there is no difference in the cost of the access line to the global IP-VPN, it is assumed to be 100.

- It should be noted that, if there is no requirement to increase the bandwidth and access lines, it is not necessary to implement one more line even if the number of connecting States has increased.

Figure 10: *The Cost Comparison between IPL and IP-VPN connectivity*

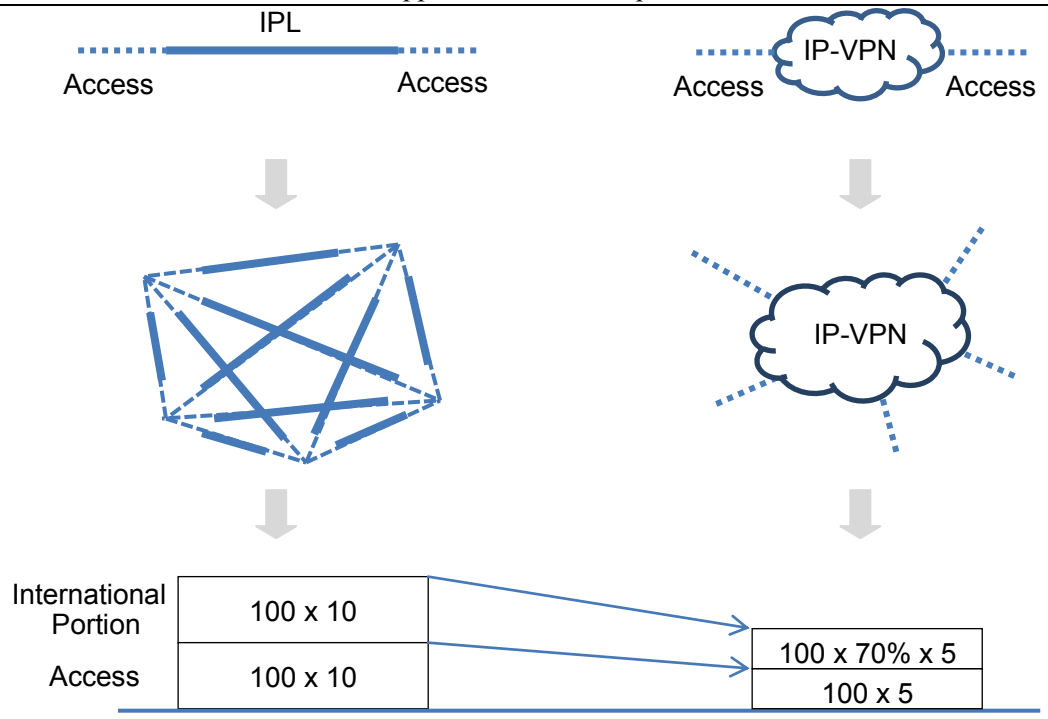
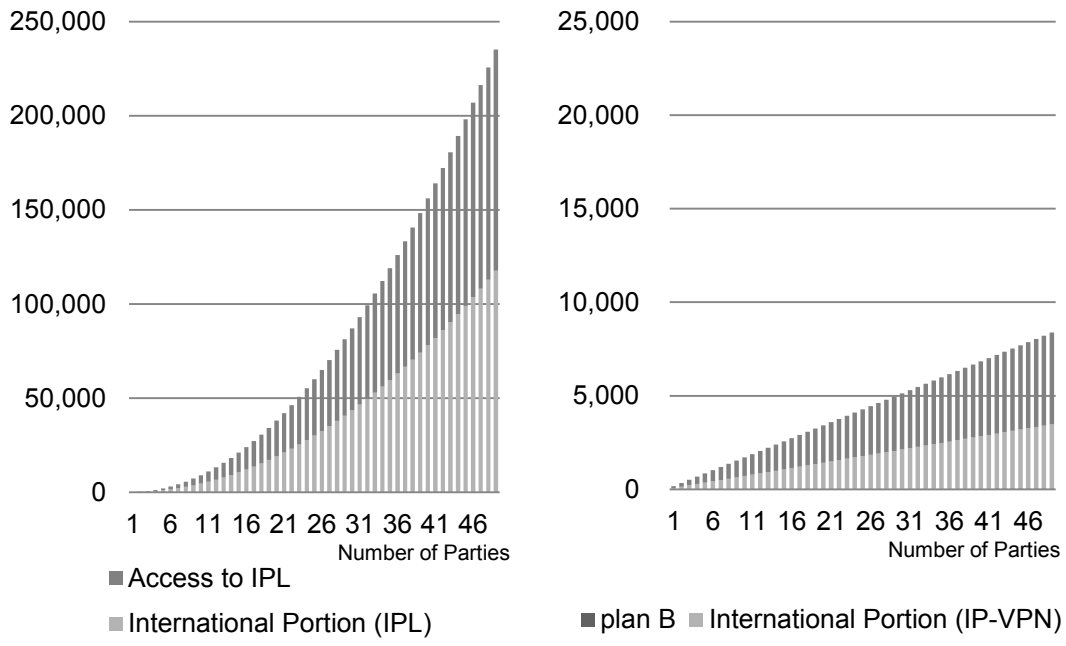


Figure 11: *The Costs increase of IPL and IP-VPN with an increasing number of Parties*



This shows that the distance between the 2 scenarios as regards the total cost of ownership has been estimated in a conservative way. Costs increase induced by greater connectivity is exponential in Scenario 1 and linear in Scenario 2. Any new need of connectivity would favour even more the scenario 2.

3. Summary

Currently, the Aeronautical Fixed Telecommunication Network (AFTN) and Air Traffic Service Message Handling System (AMHS) provide ground to ground message switching functions based on point-to-point IPLs in the Asia/Pacific Region. The protocol in use is mainly X.25 protocol, which is almost obsolete and becoming difficult to maintain.
In the Scenario 1, Do Nothing, the acquisition of new IPL circuits by half circuit arrangement between States will become increasingly difficult and require lot of time to establish. Its sustainability may even be threatened by equipment and technology obsolescence.

The Scenario 2 presents strong advantages. Since the AMHS in BBIS is equipped with a dual-stack ATN router, it corresponds to the IP network. Therefore, the IP network is a strong candidate while considering setting up of a new network to facilitate intra region communication. In addition, to achieve the GANP ROADMAP, when considering the introduction of the SWIM, the IP network is essential as a common communication platform that can be connected by various stakeholders. The implementation of the common IP network in the Asia/Pacific region will solve issues of obsolescent technology and enable the introduction of new applications.

The overall architecture of the CRV will provide use of optimum bandwidth and number of circuits for connecting between Asia/Pacific states thus providing sufficient cost benefits and will be a cost effective solution. In the future, the aircraft movement in Asia/Pacific region is forecasted to grow exponentially. Considering the above issues, the introduction of the CRV network is essential, in particular, to build up a system that can correspond to the introduction of new technology for performing collaborative decision-making.

Figure 12: *Summarized Cost Benefit Analysis for CRV*

	Scenario 1 – Do Nothing (based on ICAO survey)	Scenario 2 – Move to CRV
Quantitative benefit		

Cost	Scenario of reference Costs increase induced by greater connectivity is exponential	Expected reduction of the total cost of ownership by 23% over 10 years for 15 States (same number as for Scenario of reference) Initial one-off deployment efforts paid back in one to two years Costs increase induced by greater connectivity is linear
Performance	Lower performance due to low speed/obsolescent technology and unsuitable design	Better performance based on performance and safety monitoring, and ad hoc design including high speed technology (1~2 Mbps connectivity)
Diversity	Fallback solutions by Operator when available	Solutions available on the market (logical fallback on IP-VPN and physical diversity etc) but shall be required through user requirements and monitored
Reactivity (Delays)	Longer period to implement a new line with poor control of delays (a couple of months) Poor synchronisation in change management between APAC States	Reduced time to coordinate and implement any upgrade following pre-established and homogeneous contractual requirements (a couple of weeks)
Qualitative benefit		
Safety	Lay down by Point to point, secured by physical	Ensured through network design
International commitment	Not possible to meet ICAO GANP objectives	Possible to meet ICAO GANP objectives
Contingency	Manage with coordinating each half-circuit by both Service Providers	Manage a whole network by Service Provider
Upgradeability	Need for new line and facility to upgrade Bandwidth	Easy to upgrade Bandwidth without installing additional facility

- **Addendum**

As planned in the CRV planning, CRV Task 27 “Data Collection All states” and Task 28 “Update CBA for ACSICG/2 from RFI” may bring new elements. Particularly the Task 27 Data Collection All states may be used to update the Scenario 1 actual costs to a larger set of States (currently 15 States participated). In this case the Scenario 2 should also be updated to encompass the same number of Parties.

Besides, Task 28 “Update CBA for ACSICG/2 from RFI” could be used to ascertain the assumption made in Paragraph 2.2.2.2 on the cost reduction according to APANPIRG/24 - WP/20 Proposed Asia/Pacific Internet Protocol (IP) Virtual Private Network (VPN).

Nevertheless it is not expected that such updates would change dramatically the assessment that the Scenario 2 Move to CRV is definitively more cost efficient and operationally needed by the APAC Region, considering the expected traffic growth in the coming years.

Appendix 1

ICAO Cost Benefit Analysis Survey template

Location

1. Please specify the physical postal address of your Communication Center and its phone number

Costs

2. Please specify the monthly recurring costs and bandwidth for all circuits used for international telecommunication, for both data and voice

   Please specify for each one:

   - For data communications: which data are conveyed (AFTN, etc) and destination of the data
   - For voice communications: destination of the communications
   - Currency of the costs

Telecommunications	Application(s) conveyed	Destination	Current bandwidth	Monthly cost	Currency
Data					
Voice					

Obsolescence

3. Please specify if you experience issues with the maintenance of the international telecommunication circuits and their associated equipment

Reliability

4. Please specify the frequency of disruptions you experience in the last 2 years, and origin (last mile infrastructure, backbone, other?)
5. Please specify if you need telecommunication backup or diversity
6. Please specify if you have only one circuit for international telecommunication
7. Please specify if you need to have voice telephone service. If you do, please advise if you have any issue in maintenance support.

Required and actual performance

8. Please specify if you have required performance or service levels in your contract
9. Please specify if your provider reports about actual performance, or if you monitor the performance

10. Please specify if you need an increase in bandwidth but are unable to do so due to cost increase technical limitation of infrastructure, or contractual limitation of the service contract

Appendix 2

The Result of ICAO Cost Benefit Analysis Survey

1. State or Air Navigation Service Provider

- Australia, Airservices Australia
- Fiji (Airports Fiji Limited)
- Hong Kong China
- Japan
- India
- Macau
- Malaysia
- Mongolia
- Myanmar, Department of Civil Aviation
- New Zealand
- Republic of Korea
- Philippines
- Singapore
- Thailand
- United States (Salt Lake City, Oakland)

2. Usage Type

- data
- voice
- data + voice

3. Telecommunication Specification

Data	Voice	Data + Voice
(on a shared 64k link)	voice	C-BAND Half-Link (VSAT)
Data	(on a shared 256k link)	IPL Half-Link (E1)
IPL Half-Link (x.21)	(on a shared 64k link)	IPL Half-Link (x.21)
Land Line (E1)	As per use	IPL Whole-Link (x.21)
Shared 86k link	ETPI	SAT Whole-Link (x.21)
SITA	Land Line (4 wires)	
VSAT	Land Line (E1)	
VSAT downlink	PHILCOM	
VSAT Uplink	Shared 86k link	
	Voice	
	V-SAT	

4. Application(s) conveyed

ADS/CPDLC	1	ATS-Lease Line	1
AFTN	50	Compressed voice	4
AFTN & voice	5	DDN/Data (IP)	1
AFTN (VSAT)	2	DDN/Data+voice (IP)	2
AFTN / ATN Bis Router	1	Direct speech circuit	18
AFTN +voice (Optic)	2	DSC (1 line)	2
AFTN- Satellite	5	DSC (3 lines)	1
AFTN, AMHS	3	Hotlines	1
AFTN, AMHS, Voice	1	IASC	
AFTN, Radar, Voice	1	IDD (Programmed ISD phone)	2
AFTN/AIDC	1	IMBS	11
AFTN-Lease Line	4	Intl calls	1
AFTN-Satellite	1	PABX	1
AIDC	2	PDC/DATIS	1
AIDC/AMHS	1	Radar, voice	1
AMHS	4	Telephone	1
AMHS- Satellite	3	Voice	7
AMHS/AIDC	1	VoIP	2
ATN	1	X25 Data (AFTN)	1
ATN Bis Router	1	X25 Data (ATN)	4
ATS- Satellite	5		
TOTAL			160

5. Current bandwidth (Kbps) and number

2.4Kbps	8	86Kbps	2	768Kbps	1
4.8Kbps	6	128Kbps	7	1,540Kbps	1
8.0Kbps	6	137.5Kbps	3	1,544Kbps	2
9.6Kbps	21	142.5Kbps	3	2,048Kbps	8
19.2Kbps	1	232.5Kbps	1		
32Kbps	4	256Kbps	6		
64Kbps	70	512Kbps	1		
TOTAL	151				

6. Type of Transmission Path (LL/VSAT/Satellite) and number

Land Line	141
Satellite	15
VSAT	10
TOTAL	166

7. Costa (US$)

	For all communications	For voice only	For data only	For multiplexed data + voice
Total monthly cost of communications for all States (in USD)	415,647	185,009	162,498	68,140
Total yearly cost of communications for all States (in USD)	4,987,764	2,220,110	1,949,976	817,678
Average yearly cost by State (in USD)	332,518	148,007	129,998	54,512
Average kbps cost (in USD)	98.7			

Caveats:

- Number of States/Administrations in the survey 15
- All currencies have been converted into USD based on the March 14 rate
- Costs are a minimal estimate since costs as per use are not included

8. Contact

Australia, Airservices Australia	Communication Centre National Operation Centre Level 3 , Alan Wood Building 25 Constitution Ave, Canberra, ACT, 2600 02 6268 4150
Fiji (Airports Fiji Limited)	Nadi Air Traffic Management Center, Airports Fiji Limited, Private Mail Bag, Nadi Airport. Main Phone No. 679-6725 777 ext. 4195, 679 - No. 679-6724 600
Hong Kong China	Room 203, 2/F., Air Traffic Control Complex, 1 Control Tower Road, Hong Kong International Airport, Lantau, Hong Kong. +852 2910 6222 (Duty Supervisor)
Japan	(1) Air Traffic Management Center (ATMC) 1302-17 Nata Higashi-ku Fukuoka-city Fukuoka-Pref. 811-0204 Japan (2) Systems Development, Evaluation and Contingency Management Center (SDECC) 2-2 Kuko Ikeda-city Osaka-pref. 563-0034 Japan
India	Executive Director (CNS-OM) Airports Authority of India Rajiv Gandhi Bhawan, New Delhi -110003 91-11-24652075 / 91-11-24654142 (Fax)
Macau	ADA- Administraiton of Airports Macau International Airport, PAC on Talpa Macao, China Tel number: (+853) 2886 1111

Malaysia	Kuala Lumpur FIR Kuala Lumpur Air Traffic Control Centre (KL ATCC) Air Traffic Control Centre Block B, ATCC Complex, Sultan Abdul Aziz Shah Airport 47200 Subang Selangor Darul Ehsan Tel : +603 78473573 Fax : +603 78473572 Kota Kinabalu FIR Kota Kinabalu Air Traffic Control Centre Bangunan ATCC, 88618 Kota Kinabalu Sabah Tel : +6088 224911 Fax : +6088 219198 Kuching Sub-Centre Kuching Air Traffic Control Centre Kuching International Airport, 93728 Kuching Sarawak Tel : +6082 455572 Fax : +6082 453199
Mongolia	UB-17120, Communication Navigation Surveillance section, Civil Aviation Authority of Mongolia, Khan-Uul district, 10th khoroo, Buyant-Ukhaa, Ulaanbaatar, Mongolia Phone:+976 11 281603 Fax: +976 1170049785 Email: engineershift@mcaa.gov.mn
Myanmar, Department of Civil Aviation	ATC Tower Building, Yangon Int'l Airport Airport Road, (11021), Mingaladon Tsp: Yangon, Myanmar. 95-1-533045

New Zealand	• Main Site: 20 Sir William Pickering Drive, Russley, Christchurch, New Zealand • Contingency site: Cyrill Kay Road, Auckland Airport, Auckland, New Zealand
Republic of Korea	AFTN Center Address : 62, Haneul-Gil Gangseo-Gu Seoul, 157-711, Korea Phone : 82226602931 ACC Address : P.O.B No 29, 272, Gonghangno jung-gu Inchon 400-340, Korea Phone : 82328800335
Philippines	Civil Aviation of the Philippines, Old Mia Road, Pasay City, Philippines, 1300, +63-2-8799255
Singapore	Singapore Air Traffic Control Centre, LORADS II Building, 60, Biggin Hill Road, Singapore Postal Code 509950, Telephone No: 6214 8050 / 6214 8065 / Fax: 6545 9370
Thailand	Aeronautical Radio Of Thailand LTD. 102 Ngamduplee Tungmahamek sathorn Bangkok Thailand 10120 Tel 0-2287-3531-41
United States (Salt Lake City)	Salt Lake City Network Enterprise Management Center 2150 W. 700 N. Salt Lake City UT 84116 Main Phone Number; 801-320-2172 Oakland Air Route Traffic Control Center 5125 Central Avenue Fremont, CA 94536-6531 Main Phone Number; 510-745-3000
United States (Oakland)	Oakland Air Route Traffic Control Center 5125 Central Avenue Fremont, CA 94536-6531 Main Phone Number; 510-745-3000

9. Obsolescence

Australia, Airservices Australia	IPL circuits are not a preferred delivery method all though Australian Services Providers can still deliver the services. Current IndoSAT service to Indonesia is ageing and requires replacement.
Fiji (Airports Fiji Limited)	IPLC is phasing out as some service providers are not supporting this technology. Voice /data multiplexer has become difficulty to support as spare parts are obsolete.

Hong Kong China	Obsolescence of telecom equipment and modem at Philippines side resulting in unstable IASC/AFTN performance affecting effective ATC coordination and inducing prolonged service outage.
Japan	We have to spend the cost and period when we need to change the type of circuit, by the system upgrade, the end of legacy circuit service.
India	a) Difficulty in Availability of half circuits. b) Phasing out of certain type of medias like satellite to submarine cable (e.g. in case of Nairobi) c) Obsolescence of low speed circuits. d) Maintenance of circuits is with Communication service provider .
Macau	International telecommunication circuits are stable
Malaysia	Most of direct speech circuits between Kuala Lumpur ATCC and its neighboring ATCC (as listed in Para 2 above) are analogue circuits. The service providers at both ends are facing obsolescence issues with the network equipment used to provision these circuits. All international circuits are on half circuit arrangement whereby each ANSP will subscribe the required circuit from their preferred telecommunication service provider.
Mongolia	Currently we have no issues on our international telecommunication circuits for: Beijing (cisco 3825) with VSAT and optic Irkutsk (SDM 9880) with VSAT and optic
Myanmar, Department of Civil Aviation	The maintenance of Circuit and associated equipment for Yangon-Bangkok V-SAT link which conveyed AFTN and three DSC lines to Bangkok are done by AEROTHAI.' The land line (E1) connection to Beijing is new and under installation which is substituted to old Yangon-Beijing V-SAT link.

New Zealand	• We have experienced sever outages with the connection to Rarotonga, one that took 6months to resolve due to the hardware used on the last mile being obsolete and the replacement was unable to be configured. We ended up sending one of our technicians to assist in the resolution. • Tonga used to suffer multiple outages so we installed our own satellite dish and equipment. The circuit to Tonga is on an Airways owned Satellite link, leasing Bandwidth from a satellite Service provider. Airways is planning an expansion of satellite services in the Pacific in the next Financial Year, including Rarotonga and Samoa
Republic of Korea	Nil
Philippines	Yes
Singapore	It is getting more difficult to lease slow speed international telecom. Circuits (64kbps and below) from Telecom Service Providers in Singapore. Some Telcos have notified that they are only able to provide services for 2Mbps (E1) and above. This is a potential problem as there is no immediate need for higher bandwidth to support existing applications. Therefore bilateral counterparts may not be willing to match the higher bandwidth due to higher cost involved.
Thailand	AEROTHAI provide the ATS-satellite communication services to our neighbors. We have annual maintenance procedure in place and we will inform our users (neighbors) about the maintenance. As for the ATS lease lines service, the service provider are maintaining the circuits. However, we have not received any coordination from them with regards to maintenances. The contract that we have did not require the service provider to inform us before, however, we would like to have coordination with service provider with regards to maintenance in order to plan our alternative services accordingly.
United States (Salt Lake City)	The Voice/Data Multiplexer has become difficult to maintain as the industry has moved to Voice over Internet Protocol (VoIP) standard. The spare part can no longer be obtained from industry.

United States (Oakland)	The Voice/Data Multiplexer has become difficult to maintain as the industry has moved to Voice over Internet Protocol (VoIP) standard. The spare part can no longer be obtained from industry.

10. Reliability

(1) Frequency of disruptions you experience in the last 2 years

Australia, Airservices Australia	Fiji 13 New Zealand 12 Papua New Guinea 6 South Africa 34 Singapore 8 United States of America 9 Indonesia 14 Most faults relate to Carrier backbone.
Fiji (Airports Fiji Limited)	In the last 2 years, the circuit has been performing statisfactory. There were outages relate to the international circuits due to link problems. Traffic to adjacent Communication Centres was diverted via alternate paths when encountering link problems and no delay to traffic was recorded.
Hong Kong China	In the last 2 years, covering the period from January 2012 to December 2013, the performance of the international links was satisfactory. There were 6 interruptions for over 60 minutes on the international circuits due to link problems and AAG/SMW3 network cable problems. Traffic to adjacent Communication Centres was diverted via alternate paths when encountering link problems and no delay to traffic was recorded.
Japan	The disruptions against 38 leased circuits have been occurred 7 times in the last 2 years under the responsibility of our contracting provider, because of transmission equipment failure, urgent maintenance work, fiber damage, and network terminal unit(NTU) failure.

<table>
<tr><td>India</td><td>
<table>
<tr><th>S.No.</th><th>Circuit Name</th><th>Circuit Type</th><th>Average % Serviceability for 2012</th><th>Average % Serviceability for 2013</th></tr>
<tr><td>1.</td><td>Mumbai – Bangkok</td><td>AFTN</td><td>100</td><td>84.14</td></tr>
<tr><td>2.</td><td>Mumbai – Colombo</td><td>AFTN</td><td>100</td><td>99.33</td></tr>
<tr><td>3.</td><td>Mumbai – Karachi</td><td>AFTN/DSC</td><td>99.95</td><td>97.05</td></tr>
<tr><td>4.</td><td>Mumbai – Muscat</td><td>DSC</td><td>99.85</td><td>100</td></tr>
<tr><td>5.</td><td>Mumbai –Nairobi</td><td>AFTN</td><td>100</td><td>80.99</td></tr>
<tr><td>6.</td><td>Mumbai – Kathmandu</td><td>AFTN</td><td>100</td><td>49.41</td></tr>
<tr><td>7.</td><td>Mumbai – Singapore</td><td>AFTN</td><td>100</td><td>99.87</td></tr>
<tr><td>8.</td><td>Mumbai – Beijing</td><td>AFTN</td><td colspan="2">NOT YET IN OPERATION</td></tr>
<tr><td>9.</td><td>Mumbai - Paro</td><td>AFTN</td><td>100</td><td>88.18</td></tr>
<tr><td>10.</td><td>Kolkata - Dhaka</td><td>AFTN/DSC</td><td>100</td><td>98.27</td></tr>
<tr><td>11.</td><td>Kolkata - Yangon</td><td>DSC</td><td>100</td><td>87.58</td></tr>
<tr><td>12.</td><td>Chennai - Kualalumpur</td><td>AFTN/DSC</td><td>99</td><td>99.15</td></tr>
<tr><td>13.</td><td>Delhi - Karachi</td><td>DSC</td><td>99.25</td><td>98.19</td></tr>
<tr><td>14.</td><td>Delhi - Lahore</td><td>DSC</td><td>41.76</td><td>98.45</td></tr>
<tr><td>15.</td><td>Amritsar –Lahore</td><td>DSC</td><td>96.49</td><td>----</td></tr>
<tr><td>16.</td><td>Delhi – Karachi</td><td>IDD HOTLINE</td><td>----</td><td>----</td></tr>
<tr><td>17.</td><td>Delhi - Lahore</td><td>IDD HOTLINE</td><td>----</td><td>----</td></tr>
<tr><td>18.</td><td>Varanasi – Kathmandu</td><td>IDD HOTLINE</td><td>98.49</td><td>91.92</td></tr>
<tr><td>19.</td><td>Amritsar –Lahore</td><td>IDD HOTLINE</td><td>95.54</td><td>----</td></tr>
<tr><td>20.</td><td>Kolkata - Kathmandu</td><td>IDD HOTLINE</td><td>----</td><td>95.78</td></tr>
<tr><td>21.</td><td>Kolkata – Dhaka</td><td>IDD HOTLINE</td><td>----</td><td>----</td></tr>
<tr><td>22.</td><td>Guwahati - Dhaka</td><td>IDD HOTLINE</td><td>96.45</td><td>100</td></tr>
<tr><td>23.</td><td>Agartala - Dhaka</td><td>IDD HOTLINE</td><td>84.23</td><td>96.54</td></tr>
<tr><td>24.</td><td>Chennai - Colombo</td><td>IDD HOTLINE</td><td>99.67</td><td>99.27</td></tr>
<tr><td>25.</td><td>Chennai - Median</td><td>IDD HOTLINE</td><td>99.30</td><td>100</td></tr>
<tr><td>26.</td><td>Chennai - Yangon</td><td>IDD HOTLINE</td><td>87.66</td><td>98.98</td></tr>
<tr><td>27.</td><td>Trivandrum - Colombo</td><td>IDD HOTLINE</td><td>100</td><td>100</td></tr>
<tr><td>28.</td><td>Mumbai – Karachi</td><td>IDD HOTLINE</td><td>100</td><td>94.88</td></tr>
<tr><td>29.</td><td>Ahmedabad - Karachi</td><td>IDD HOTLINE</td><td>97.67</td><td>----</td></tr>
</table>
</td></tr>
<tr><td>Macau</td><td>4 times in the last 2 years, due to service enhancement works or maintenance activities by Telecommunication Service Provider</td></tr>
<tr><td>Malaysia</td><td>The service disruptions occurred almost every month on certain circuits and it took a very long to restore. Among the circuits that used to have long outages are:
• Kota Kinabalu – Manila
• Kota Kinabalu – Ujung Pandang (VSAT)
• Kuala Lumpur – Chennai
The problem could originate from either side and mostly due to the last mile cable cut or equipment obsolescence issues</td></tr>
<tr><td>Mongolia</td><td>No issues except solar interference, during the solar interference the AFTN is switched to optic.</td></tr>
</table>

<table>
<tr><td>Myanmar, Department of Civil Aviation</td><td>Nil</td></tr>
<tr><td>New Zealand</td><td>• Tonga suffers every year due to Solar events but this is manageable and the local technician is excellent.
• We continue to have several outages a year with Rarotonga that appear to be a combination of backbone and last mile issues.</td></tr>
<tr><td>Republic of Korea</td><td>Nil</td></tr>
<tr><td>Philippines</td><td>6 outages/month (average in the last two years) on Hong Kong AFTN
5 outages/month (average in the last two years) on Singaore Hotline and AFTN
2 outages/month (average in the last two years) on Oakland, Ujung Pandang, Kota Kinabalu, Ho Chi Minh, Taipei,
1 outage/month (average in the last two years) on Naha, Fukuoka, Hong Kong</td></tr>
<tr><td>Singapore</td><td>Disruptions of services vary from one country to another, ranging from no or very little disruption to almost every day experiencing circuit issues. Faults are also varied: last mile infrastructure like modems, servers; international link outages etc</td></tr>
<tr><td>Thailand</td><td>
<table>
<tr><th>Site</th><th>Link Type</th><th>No. of failure
1-jan-2013 to 1-jan-2014</th><th>Cause</th></tr>
<tr><td>Rome</td><td>Lease Line</td><td>20</td><td>cable fail</td></tr>
<tr><td>Singapore</td><td>Lease Line</td><td>4</td><td>cable fail</td></tr>
<tr><td>Mumbai</td><td>Lease Line</td><td>22</td><td>cable fail</td></tr>
<tr><td>Hongkong</td><td>Lease Line</td><td>4</td><td>cable fail</td></tr>
</table>
<table>
<tr><th>Site</th><th>Link Type</th><th>No. of failure
1-jan-2012 to 1-jan-2014</th><th>Cause</th></tr>
<tr><td>Dhaka</td><td>Satellite</td><td>9</td><td>maintenance ,electrical and equipment fail</td></tr>
<tr><td>Yangon</td><td>Satellite</td><td>5</td><td>maintenance and equipment fail</td></tr>
<tr><td>Hochiminh</td><td>Satellite</td><td>5</td><td>maintenance and equipment fail</td></tr>
<tr><td>Kuala lumpur</td><td>Satellite</td><td>4</td><td>maintenance and equipment fail</td></tr>
<tr><td></td><td>Lease Line</td><td>17</td><td>submarine communications cable fail and maintenance submarine communications cable</td></tr>
<tr><td>Vientiane</td><td>Satellite</td><td>6</td><td>maintenance ,electrical and equipment fail</td></tr>
<tr><td>Phnom Penh</td><td>Satellite</td><td>4</td><td>maintenance ,electrical and equipment fail</td></tr>
</table>
</td></tr>
<tr><td>United States (Salt Lake City)</td><td>The circuits have not had any issues yet. The equipment is maintained using in-house maintenance personnel and spare part. It is noted that by the end of 2014, the industry will not offer additional bandwidth nor new dedicated circuit. This will impact support for future requirement</td></tr>
</table>

United States (Oakland)	The circuits have not had any issues yet. The equipment is maintained using in-house maintenance personnel and spare part. It is noted that by the end of 2014, the industry will not offer additional bandwidth nor new dedicated circuit. This will impact support for future requirement

(2) Need for telecommunication backup or diversity

Australia, Airservices Australia	Airservices operates two enroute centres, one in Brisbane and one in Melbourne. Each centre backs up the other, so connections need to be made to both.
Fiji (Airports Fiji Limited)	Yes. We have only one center without any redundant international link for communication diversity.
Hong Kong China	There are normally main and standby circuits for local tails due space diversity of local main/backup communication centres. Resilience arrangements are solicited from teleco for international connections to oversea counterparts, e.g. ring, satellite and submarine, two backbone circuits, etc. for network protection in the form of Service Level Agreement with CAD.
Japan	We have to establish 2 access lines to CRV in Japan. The one will be used at ATMC for operational purpose, the other will be done at SDECC(Systems Development Evaluation and Contingency Management Center) in Osaka there are backup features when ATMC is suffered or lost the feature by the disaster .
India	Yes definitely backup is required as it will ensure enhanced service levels
Macau	Yes we need

Malaysia	There is a backup service over VSAT available for Kuala Lumpur – Bangkok only. The diversity or backup is required since a single circuit especially in digital platform are normally carrying both data and voice traffic. Line failure will affect total failure of communication between both ANSPs, hence affecting the efficiency of traffic coordination and safety.
Mongolia	We have Optic and VSAT for both Beijing and Irkutsk.
Myanmar, Department of Civil Aviation	telecommunication link to India for ADSB data sharing, AFTN, AIDC and DSC
New Zealand	• Within New Zealand yes. We currently have a connection point at our Main operations centre in Christchurch and another connection at our operations centre in Auckland. These two are linked via our own network and form part of a ring network with other states.
Republic of Korea	Nil
Philippines	Yes
Singapore	Yes, both. Our backup is usually additional/redundant link which we can fall back on if the main circuit goes down. As for diversity, we can either send/receive AFTN/AMHS messages from more than one routing based on the routing tables if the main route has problem.
Thailand	We wish to have backup / diversity for all ATS links to reduce the single point of failure. The redundancy line should follow common rule that all paths / equipments of the line should be duplicated and separate, e.g. fiber used for each line should be different, lines coming in our facility should be separated, equipments should be duplicated and separate, termination points should be separated, etc.
United States (Salt Lake City)	Yes.
United States (Oakland)	Yes.

(3) Have only one circuit for international telecommunication?

Australia, Airservices Australia	Airservices has 9 stand alone international circuits which carrier Voice and Data
Fiji (Airports Fiji Limited)	AFL has 4 dedicated international IPLC circuit that carry voice & data traffic.
Hong Kong China	There is only one backbone circuit subscribed for each international data connection, more than one circuits are arranged for IASC telephone connection with each counterpart.
Japan	None
India	No
Macau	have more than 1 circuit for international telecommunication with connections to Zhuhai and Hong Kong
Malaysia	There are multiple circuits available between Malaysian FIRs and neighboring FIRs.
Mongolia	We have 2 international telecommunication circuits such as Irkutsk (Russia), and Beijing (China)
Myanmar, Department of Civil Aviation	Nil
New Zealand	• We have 6 circuits
Republic of Korea	Nil
Philippines	- No for Oakland, Ujung, Kota, Ho Chi Minh, Taiei,Hong Kong - Yes for Naha, Fukuoka, Singapore
Singapore	Not Applicable.
Thailand	Not Applicable.

United States (Salt Lake City)	No. FAA has 6 dedicated circuits to Asia/Pacific region in addition to multiple connections to Pacific region using public internet or internal telecommunication network.
United States (Oakland)	No. FAA has 6 dedicated circuits to Asia/Pacific region in addition to multiple connections to Pacific region using public internet or internal telecommunication network

11. Voice telephone service

Australia, Airservices Australia	Airservices has voice intercoms to international ANSP's as indicated in Question 2. We already mix voice and data together on many of our lines and we see this as necessary for the success of the CRV. Without voice on the CRV the cost/benefit is much poorer as we would then need to establish a separate solution for the voice."
Fiji (Airports Fiji Limited)	We have voice intercom to adjacent FIR centters (Brisbaneia, Auckland, Oakland) and ANSP (New Caledonia) using the voice/data mux and telephone circuit to Vanuatu, Kiribati & Tuvalu)
Hong Kong China	CAD has IASC telephone connections to Guangzhou, Haikou, Macao, Taipei and Manila, respectively. IDD phones are the backup systems for IASC phones.
Japan	We expect the CRV to use voice over Internet Protocol (VoIP).Instead of installing the voice router maintenance, we have to install the monitoring equipment of voice router.
India	Yes voice circuits are already in use. Issues similar to data circuits.
Macau	Yes, needed. However, service will be interrupted when maintenance work is performed by Telecom SP. Coordination with end users has to be carried out to minimize impact
Malaysia	Voice telephone service (or also known as International Direct Dialing – IDD) is essential as alternative communication to direct speech circuit. There is no issue with regards to the availability and maintenance support for voice telephone service in Malaysia

Mongolia	Both of our AFTN terminals have voice telephone services. No issue in maintenance support.
Myanmar, Department of Civil Aviation	Nil
New Zealand	• We have voice services off our Voice Communication System (VCS) to Tonga, USA, Australia and Fiji. • We utilize PABX phone lines to Tahiti, Rarotonga and Samoa
Republic of Korea	Nil
Philippines	Yes, also expericning maintenance support on voice telephone service
Singapore	Yes we do need to coordinate with adjacent FIRs and ATC centre. Currently we don't have any issue with maintenance support
Thailand	We do need to have voice telephone service. Furthermore, for those voice telephone services, we truly need to have the maintenance procedure in place due to its importance.
United States (Salt Lake City)	Yes. FAA has many voice services to Asia/Pacific region. The FAA is in the process to replace the voice service that is based on voice/data multiplexer to VoIP.
United States (Oakland)	Yes. FAA has many voice services to Asia/Pacific region. The FAA is in the process to replace the voice service that is based on voice/data multiplexer to VoIP.

12. Required and actual performance

(1) Required performance or service levels in your contract

Australia, Airservices Australia	All services have services level associated with them for response and restoration of faults
Fiji (Airports Fiji Limited)	We are still discussing with our service provider for an SLA. Our performance availability requirement is 99.99%.

Hong Kong China	Resilience arrangements are solicited from teleco for international connections to oversea counterparts, e.g. ring, satellite and submarine, two backbone circuits, etc. for network protection in the form of Service Level Agreement. The availability performance pledge required is at least 99.99%. Direct links with minimal and predictable data transmission delay for safety critical information.
Japan	Our systems require connecting to the closed network for the security, for example, except the connection to the public internet circuit.
India	At present no SLAs exist in our contract for international circuits.
Macau	On circuit breakdown reported to the TSP, promptly investigate the cause, repair and restore the service at the shortest practicable time
Malaysia	The service provider in Malaysia is unable to offer service level guarantee to international private leased circuits (IPLC) on half circuit arrangement. It is on best effort basis and very much depends on the good coordination telecommunication service providers at both ends.
Mongolia	No
Myanmar, Department of Civil Aviation	Nil
New Zealand	• I am not aware of any
Republic of Korea	Nil
Philippines	It is not specified in our contracts but we require the service providers to maintain no less than 97% serviceability and reliability in accordance with ICAO standard/requirements
Singapore	Yes we do. Currently the service performance for half-circuits for bilateral agreement is up to 99% or better, from Singapore-end to the international front end.

<table>
<tr><td>Thailand</td><td>
<table>
<tr><th>Site</th><th>Required Performance (%)</th></tr>
<tr><td>Rome (Lease Line)</td><td>99.9000</td></tr>
<tr><td>Hong Kong (Lease Line)</td><td>99.9000</td></tr>
<tr><td>Singapore (Lease Line)</td><td>99.9000</td></tr>
<tr><td>Mumbai (Lease Line)</td><td>99.9000</td></tr>
<tr><td>Kuala Lumpur (Lease Line)</td><td>99.9000</td></tr>
<tr><td>Kuala Lumpur (Satellite)</td><td>99.9700</td></tr>
<tr><td>Dhaka (Satellite)</td><td>99.9700</td></tr>
<tr><td>Yangon (Satellite)</td><td>99.9700</td></tr>
<tr><td>Ho Chi Minh (Satellite)</td><td>99.9700</td></tr>
<tr><td>Vientiane (Satellite)</td><td>99.9700</td></tr>
<tr><td>Phnom Penh (Satellite)</td><td>99.9700</td></tr>
<tr><td>Kun Ming (Satellite)</td><td>99.9700</td></tr>
</table>
</td></tr>
<tr><td>United States (Salt Lake City)</td><td>FAA operational requirement for a circuit/connection is 99.5%. Overall performance availability requirement is 99.9%. The 99.9% of service availability requirement is defined by using the voice service as a backup for AIDC and AFTN/AMHS backup is supported by dual AMHS as well as alternative routing.</td></tr>
<tr><td>United States (Oakland)</td><td>FAA operational requirement for a circuit/connection is 99.5%. Overall performance availability requirement is 99.9%. The 99.9% of service availability requirement is defined by using the voice service as a backup for AIDC and AFTN/AMHS backup is supported by dual AMHS as well as alternative routing.</td></tr>
</table>

(2) Does your provider report about actual performance, or if you monitor the performance

Australia, Airservices Australia	Performance is monitored by Airservices.
Fiji (Airports Fiji Limited)	We can only monitor the performance of the link through the operational status of the circuit. We rely on the service providers advice on the link outages and causes.

Hong Kong China	CAD monitors the real-time performance of international circuits on application availability perspective on daily basis. Any anomaly will be checked with teleco and counterparts for confirmation of root cause as well as liaison for timely implementation of mitigation measures in order to resume services.
Japan	Our provider reports immediately when the line disconnection occurred, and in monthly, they report the rate of operation, the detail of line disconnected and the network undersea cable to us.
India	Performance is monitored in house on Daily/Monthly basis. But no regular reports are received from the service provider.
Macau	Circuits are stable. Performance report provided on abnormal fault
Malaysia	The monitoring of performance is achieved by having monthly report based on the docket issued for each occurrence of service disruption.
Mongolia	We report about the actual performance
Myanmar, Department of Civil Aviation	SITA reports actual performance and the others are done by self monitoring.
New Zealand	• At present we only monitor the Tonga link as that is the only IP one. This is still being developed. • Telecom New Zealand will provide us with information regarding outages, resolution and why the outage occurred.
Republic of Korea	Nil
Philippines	Monthly outages are submitted to the provider whilst monitoring circuit availability
Singapore	Yes, service providers submit monthly reports about actual performance of the circuits contracted as well as any major faults with frequent updates on the status. Separately, we also monitor the circuit performance at the AFTN/AMHS Comcentre.

<table>
<tr><td>Thailand</td><td>
<table>
<tr><th>Site</th><th>Actual Performance(%)</th></tr>
<tr><td>Rome (Lease Line)</td><td>91.7136</td></tr>
<tr><td>Hong Kong (Lease Line)</td><td>99.9231</td></tr>
<tr><td>Singapore (Lease Line)</td><td>99.9486</td></tr>
<tr><td>Mumbai (Lease Line)</td><td>93.0222</td></tr>
<tr><td>Kuala Lumpur (Lease Line)</td><td>93.3753</td></tr>
<tr><td>Kuala Lumpur (Satellite)</td><td>99.4813</td></tr>
<tr><td>Dhaka (Satellite)</td><td>99.9471</td></tr>
<tr><td>Yangon (Satellite)</td><td>99.9589</td></tr>
<tr><td>Ho Chi Minh (Satellite)</td><td>97.8154</td></tr>
<tr><td>Vientiane (Satellite)</td><td>99.9374</td></tr>
<tr><td>Phnom Penh (Satellite)</td><td>99.8763</td></tr>
<tr><td>Kun Ming (Satellite)</td><td>99.9952</td></tr>
</table>
</td></tr>
<tr><td>United States (Salt Lake City)</td><td>The FAA has a capability to monitor the network performance. However, most of its international circuits are shared 50% with other ANSPs that prevent it from a complete end-to-end monitoring. This caused delay in identifying the failure and correction in a timely manner</td></tr>
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</table>

(3) Need for an increase in bandwidth?

Australia, Airservices Australia	No , at this stage this is not an issue but in the future the CRV should be flexible in the ability to increase bandwidth when required for applications such as System Wide Information Management (SWIM)
Fiji (Airports Fiji Limited)	No, we do not need any increase in bandwidth on the existing operational requirements but more bandwidth will be required in future to support the ASBU initiatives.
Hong Kong China	Increase in bandwidth to at least 64kbps for connection of ATN/AMHS services with Backbone Boundary Intermediate System (BBIS) and Boundary Intermediate System (BIS) is planned.
Japan	None

India	At present there are no plans to increase BW for international circuits however, Airports Authority of India has plans to upgrade Bandwidth as per various service requirements including RADAR, ADS-B, VHF Data, GNSS etc apart from AFTN/Voice within India based on MPLS cloud. This MPLS domestic cloud will support all the international leased circuits
Macau	Current bandwidth of international telecom circuits sufficient. Increase in bandwidth is necessary for future service(s) and/or backup/diversity
Malaysia	There are requirements for increase in bandwidth such as communication lines to Jakarta and Singapore as well as migration from analog platform to digital using IP-based communication system. There is no issue on Malaysia side since all voice switches are already upgraded to new digital platform. However, there may be technical issues with neighboring ATCCs which are still using legacy voice switches. There are also issues with regards to cost to subscribe for additional bandwidth due to the contractual limitation faced by the neighboring ANSPs.
Mongolia	We have enough bandwidth to support our international telecommunication circuit, we also have optic communication system.
Myanmar, Department of Civil Aviation	Myanmar need to increase bandwidth of Yangon-Bangkok V-SAT link and upgrade to IP connection for AFTN/AMHS, DSC and future data link applications. But Myanmar and AEROTHAI have coordination and continues action for this issue
New Zealand	• The FAA has recently increased the bandwidth on the Christchurch to Oakland circuit due to a contract expiry and they are now paying for the cost of the whole circuit. • We looked at doing the same with the Auckland to Brisbane circuit, however the cost of doing this is prohibitive.
Republic of Korea	Nil
Philippines	No bandwidth issues were encountered so far on the listed circuits

Singapore	Currently, there is no urgent or immediate need for increase in bandwidth. The difficulty we faced usually is due to cost factor. Since most of the circuits are bilateral, both States must agree to the cost increase (if any) to be incurred at their own end before proceeding with the procurement.
Thailand	As for our satellite services, we have enough spare bandwidth to accommodate an increase (temporally) in bandwidth usage without additional cost. However, for the lease lines, we do have restriction for connection with certain sites due to hardware limitation, e.g. no available port or timeslot. Furthermore, requesting for more bandwidth requires additional charges, which will take a long time for us to get approved.
United States (Salt Lake City)	Yes. The FAA is in need to increase the bandwidth to support Traffic Flow Management data, weather data, etc. but unable to carry out due to high cost incurred to other ANSPs. In addition, it is time consuming to upgrade the service as the selected vendors have to establish business process to each other and the process to obtain formal bi-lateral agreement. It's usually taken 3-5 years to upgrade telecommunication service between ANSPs.
United States (Oakland)	Yes. The FAA is in need to increase the bandwidth to support Traffic Flow Management data, weather data, etc. but unable to carry out due to high cost incurred to other ANSPs. In addition, it is time consuming to upgrade the service as the selected vendors have to establish business process to each other and the process to obtain formal bi-lateral agreement. It's usually taken 3-5 years to upgrade telecommunication service between ANSPs

PREPARATION WORKS, STRUCTURE AND CONTENT OF RFI FOR CRV PROCUREMENT

Preparation work before RFI invitation

The scope of the RFI preparation could include the following:

1) Establish background of the entity calling the RFI
2) Establish the purpose of the RFI
3) Research on Potential Vendor / Contractor
4) Research on MPLS and IP VPN; and are any other alternatives available.
5) Gather first iteration of user requirements from member States, based on user requirements template and derived from CONOPS.
6) Potential issues in implementation of the common regional Internet *including the technical and commercial limitations of member States and control of future upgrading costs
7) Deployment of MPLS and IP VPN including implementation schedule and various interface requirements
8) Approach to address security for MPLS and IP VPN
9) Any other scope that should be included, etc.

Structure of RFI invitation document

The structure of the RFI could have the following sections so that the information received can be evaluated in systematic and efficient manner.

1) Introduction to the RFI
    i) Title of the RFI
    ii) Date of the RFI
    iii) Agency / Organization where the RFI originated (ICAO – APANPIRG –CNS MET Sub-Group – ACSICG – CRV TF)
    iv) Explanation for the issue of this RFI
    v) Instruction for submission of RFI including the citation in **Annex A.**
2) Issues to be addressed in RFI including current limitations and potential challenges.
3) Questionnaire
4) Content of RFI response
5) Proposal Template
6) Non-Disclosure Agreement / Secrecy Act; if required.
7) Any other structure deemed necessary to have a complete RFI.

Content

The content of the response to RFI could include the following:

<u>Supplier Information</u>

1) Brief description about Communication Service Provider (CSP)'s company and background, financial standing, current active customers and Telco and CSP partners.
2) Telecom's existing MPLS deployment in the Asia-Pacific Region and globally.

<u>Existing Infrastructure</u>

3) Network Infrastructures that CSP has currently in place in the Asia-Pacific Region and for interconnections with other regions.
4) Potential use of other technology to meet our requirement.

Solutions and Performance

5) Proposed outlines of designs/solutions that could meet the requirements and address the issues listed in the RFI invitation document.

6) Typical process for building the design of the solution

7) Examples of commitments in performance requirements with other customers (latency, jitters, delay, routing protocol, QoS)

8) Typical Traffic that can be carried by the service

Safety-Security

9) Previous references in dealing with safety requirements and Security requirements (Confidentiality, Integrity and Availability).

10) Description of solutions used to achieve Redundancy and Network Reliability

11) Description of solutions used for network security, and associated typical costs

Project Implementation

12) Typical deployment process from the start of order, site survey, placing order, licensing, installation, testing, commissioning and handover.

Network Management, Problem Determination and Resolution

13) Typical Supervision solutions proposed (both internal and interface to customers)

14) H24/7 support: typical CSP organization and ways to interface with customers

15) Typical process for configuration management, Fault management (e.g. schedule maintenance, response time, recovery time etc).

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Commercial Portion

17) Typical cost of IP VPN connections

18) Typical Service Level Agreement and Service Level Guarantee

19) Terms and Conditions by the CSP.

20) Special Contract Termination clauses

21) Feedback on envisaged Contract Period; including minimum and maximum period, if any

22) Re-contractual clauses

23) Consortium Arrangement and/or Partner Arrangement with description of Accountabilities and Areas of Responsibilities.

24) Possible type of billing that can be arranged (One-Time Charge, Monthly, Quarterly, Yearly, Pre-Paid, Post-Paid)

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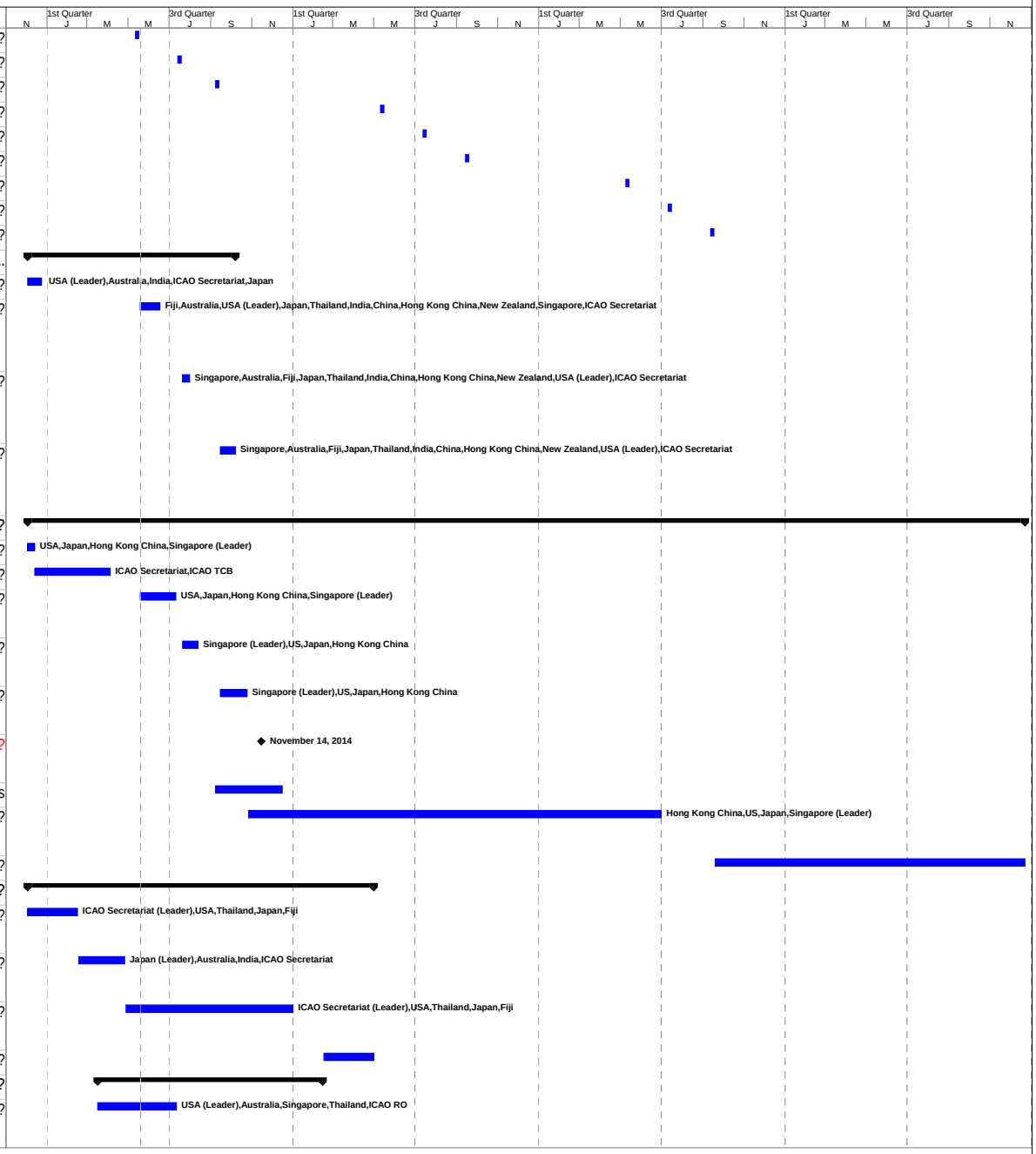
Tue 5/20/14

ID	CRV Task	Task Name	Start	Finish	Predecessors	Duration
1	1	ACSICG/1	Mon 5/12/14	Fri 5/16/14		5 days?
2	2	CNS SG/18	Mon 7/14/14	Fri 7/18/14		5 days?
3	3	APANPIRG/25	Mon 9/8/14	Fri 9/12/14		5 days?
4	4	ACSICG/2	Mon 5/11/15	Fri 5/15/15		5 days?
5	5	CNS SG/19	Mon 7/13/15	Fri 7/17/15		5 days?
6	6	APANPIRG/26	Mon 9/14/15	Fri 9/18/15		5 days?
7	7	ACSICG/3	Mon 5/9/16	Fri 5/13/16		5 days?
8	8	CNS SG/20	Mon 7/11/16	Fri 7/15/16		5 days?
9	9	APANPIRG/27	Mon 9/12/16	Fri 9/16/16		5 days?
10	**10**	CONOP	Tue 12/3/13	Tue 10/7/14		220.36 day...
11	11	Draft CONOP	Tue 12/3/13	Mon 12/23/13		14.8 days?
12	12	Update CONOP from ACSICG/1	Mon 5/19/14	Tue 6/17/14	1	21.27 days?
13	13	Update CONOP from CNS/18	Mon 7/21/14	Thu 7/31/14	2	8.73 days?
14	14	Refine CONOP after APANPIRG	Mon 9/15/14	Tue 10/7/14	3	16.36 days?
15	**15**	MSA/DoA	Tue 12/3/13	Fri 12/22/17		1059 days?
16	16	Draft DoA	Tue 12/3/13	Fri 12/13/13		8.5 days?
17	17	Funding Cost Assessment	Fri 12/13/13	Fri 4/4/14	16	80 days?
18	18	Update MSA/DoA from ACSICG/1	Mon 5/19/14	Thu 7/10/14	1	39 days?
19	19	Update MSA/DoA from CNS/18	Mon 7/21/14	Tue 8/12/14	2	17 days?
20	20	Finalize MSA for Signature (if needed)	Mon 9/15/14	Fri 10/24/14	3	30 days?
21		Deadline to decide to be a Pioneer Party	Fri 11/14/14	Fri 11/14/14		1 day?
22	21	Sign MSA (Stage 1)	Mon 9/8/14	Mon 12/15/14	3SS	71 days
23	22	Finalize DOA (Stage 2) for Signature	Mon 10/27/14	Thu 6/30/16	20,34,64FF	439 days?
24	23	Sign DoA (Stage 2)	Mon 9/19/16	Fri 12/22/17	23,9,64	330 days?
25	24	CBA	Tue 12/3/13	Thu 4/30/15		368 days?
26	25	Data Collection (Including State Letter)	Tue 12/3/13	Fri 2/14/14		54 days?
27	26	Draft CBA for ACSICG/1	Mon 2/17/14	Fri 4/25/14	26	50 days?
28	27	Data Collection All Parties	Mon 4/28/14	Wed 12/31/14	27	178 days?
29	28	Update CBA for ACSICG/2 from RFI	Mon 2/16/15	Thu 4/30/15	35	54 days?
30	**29**	RFI	Mon 3/17/14	Fri 2/13/15		240 days?
31	30	Draft RFI	Mon 3/17/14	Fri 7/11/14	11	85 days?

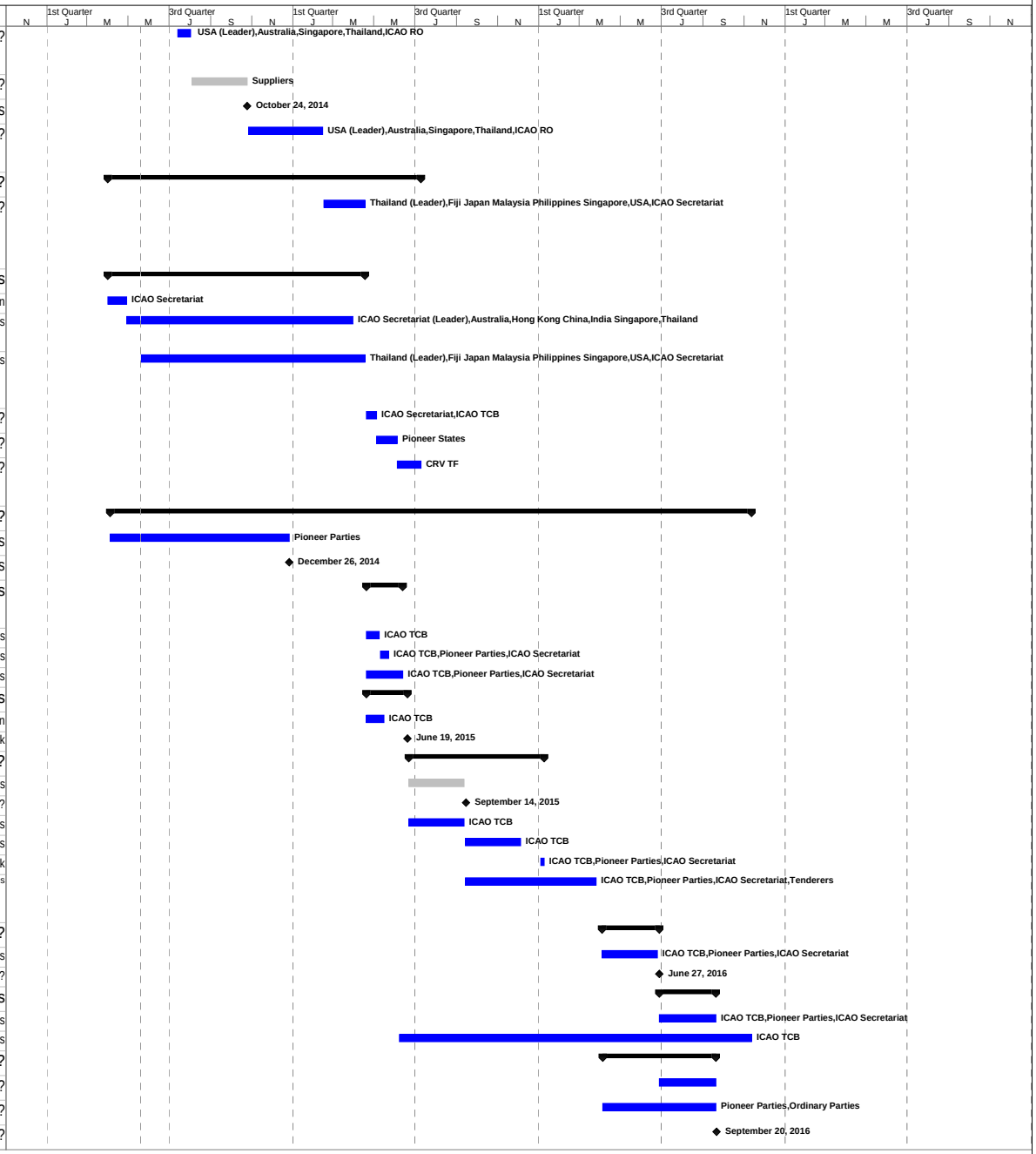


Project: CRVTFProject_rev07

Task	Summary	External Milestone	Manual Task	Manual Summary	External Tasks	Deadline
Split	Project Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	
Milestone	External Tasks	Inactive Summary	Manual Summary Rollup	Finish-only	Progress	

Tue 5/20/14

ID	CRV Task	Task Name	Start	Finish	Predecessors	Duration
32	31	Release of RFI	Mon 7/14/14	Fri 8/1/14	31	15 days?
33	32	Waiting Response	Mon 8/4/14	Fri 10/24/14	32	60 days?
34	33	RFI Close	Fri 10/24/14	Fri 10/24/14	33	0 days
35	34	Review and Process RFI	Mon 10/27/14	Fri 2/13/15	34,1,27	80 days?
36	**35**	**RFP**	Tue 4/1/14	Thu 7/9/15		333 days?
37	36	Gather State Information	Mon 2/16/15	Fri 4/17/15	14,35	45 days?
38	**37**	**Generate Requirements**	Tue 4/1/14	Fri 4/17/15		274 days
39	37-a	Make User Requirement Template	Tue 4/1/14	Mon 4/28/14		1 mon
40	37-b	Make Safety Preliminary analysis	Tue 4/29/14	Mon 3/30/15	39	12 mons
41	37-c	Make user Requirements	Tue 5/20/14	Fri 4/17/15		11.95 mons
42	38	Determine Selection Process	Mon 4/20/15	Mon 5/4/15	22,41	11 days?
43	39	Determine Awarding Process	Tue 5/5/15	Thu 6/4/15	42	23 days?
44	40	Update APANPIRG/26 on Sealed Tender	Fri 6/5/15	Thu 7/9/15	43	25 days?
45	**41**	**TCB Process**	Fri 4/4/14	Fri 11/11/16		680.5 days?
46	42	Funding Preparation	Fri 4/4/14	Fri 12/26/14	17	190 days
47	43	Funds are ready	Fri 12/26/14	Fri 12/26/14	46	0 days
48	**44**	**TCB Requirement Reviews and Packaging**	Mon 4/20/15	Fri 6/12/15	22,38,47	40 days
49	44-a	(a) Review the technical specifications	Mon 4/20/15	Fri 5/8/15	41	3 wks
50	44-b	(b) Develop the evaluation criteria	Mon 5/11/15	Fri 5/22/15	49	2 wks
51	44-c	(c) Prepare tender documents	Mon 4/20/15	Fri 6/12/15		2 mons
52	**45**	**TCB Publication of Sealed Tender**	Mon 4/20/15	Fri 6/19/15		45 days
53	45-d	(d) Identify suitable suppliers	Mon 4/20/15	Fri 5/15/15	49SS	1 mon
54	45-e	(e) Advertise Sealed Tender (ST)	Mon 6/15/15	Fri 6/19/15	53,51	1 wk
55	**46**	**Consultation & ST Response**	Mon 6/22/15	Fri 1/8/16	54	145 days?
56		Wait for proposals from Tenderers	Mon 6/22/15	Fri 9/11/15	54	60 days
57		Proposals from Tenderers	Mon 9/14/15	Mon 9/14/15	56	1 day?
58	46-f	(f) Coordinate site surveys	Mon 6/22/15	Fri 9/11/15		3 mons
59	46-g	(g) Handle tender clarifications	Mon 9/14/15	Fri 12/4/15	58	3 mons
60	46-h	(h) Face to Face meeting with RT	Mon 1/4/16	Fri 1/8/16	59FS+1 mon	1 wk
61	**53**	**Establish Common Provisions (including CRV design and SLA)**	Mon 9/14/15	Fri 3/25/16	59SS	7 mons
62	**47**	**Selection**	Mon 4/4/16	Mon 6/27/16	60FS+3 mo	61 days?
63	47-i	(i) Carry out a preevaluation and evaluation mee	Mon 4/4/16	Fri 6/24/16		3 mons
64	48-l	(l) Notify selection to supplier	Mon 6/27/16	Mon 6/27/16	63	1 day?
65	**49**	**Contract preparation**	Tue 6/28/16	Mon 9/19/16	64	60 days
66	49-k	(k) Prepare Individual Service Contract template	Tue 6/28/16	Mon 9/19/16		3 mons
67	49-j	(j) Participate as a technical advisor to the CRV Ta	Mon 6/8/15	Fri 11/11/16		375 days
68	**50**	**Implementation Plan**	Tue 4/5/16	Mon 9/19/16		120 days?
69	51	Draft Implementation Plan	Tue 6/28/16	Mon 9/19/16	62	3 mons?
70	52	OOG Setting Up and Staffing	Tue 4/5/16	Mon 9/19/16	69FF	6 mons?
71		Start Individual Service Contracts	Tue 9/20/16	Tue 9/20/16	66	1 day?



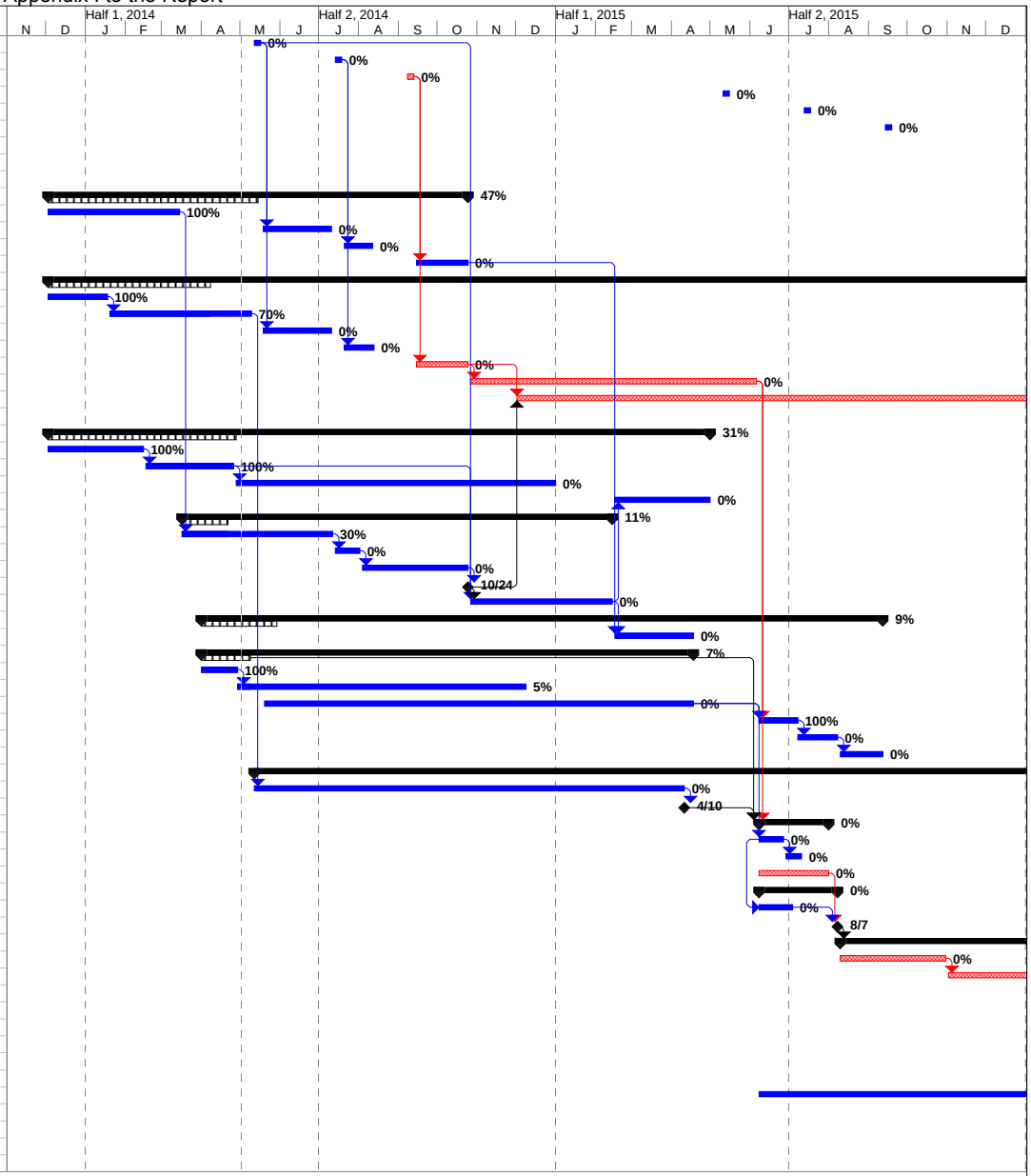
Project: CRVTFProject_rev07

Task	Summary	External Milestone	Manual Task	Manual Summary	External Tasks	Deadline			
Split	Project Summary	Inactive Milestone	Duration-only	Start-only	External Milestone				
Milestone	External Tasks	Inactive Summary	Manual Summary Rollup	Finish-only	Progress				

Reference	Who	What	Due date	Status	Completed on	Result	Comment
A1-1	Chonlawit Banphawatthanarak	to appoint a leader for CONOP section 3	30/01/14	Closed	18/02/14	Hoang Tran takes care of section 3	
A1-2	all	to provide comments on draft DoA to Mohammad Zaki Bin Ariffin	07/03/14	Closed	06/03/14	Version v1r2 with comments on v1r1 was provided to the meeting	
A1-3	all	to provide comments on planning rev03 to Chonlawit Banphawatthanarak	12/03/14	Closed	12/03/14	Planning rev03 is validated	
R1-1	Chonlawit Banphawatthanarak	Plan a supplementary meeting end of 2014 between concerned States to endorse and sign the MSA	30/09/14	Open			Only if Risk R1 likelihood changes to « certain »
A1-4	Frederic Lecat	to coordinate with Manjit Sigh (ICAO TCB) to start the cost assessment of RFP process	30/01/14	Closed	06/03/14	Document "CRV Task Force - Task DoA_Agenda Item 5_7Mar2014_Input by Manjit" was delivered to the meeting on 06/03/14	
A1-5	Frederic Lecat	to develop a view of the signing process	12/5/2014	Closed	7/4/2014	Email [CRV] Meeting on draft DOA #2 - inputs Document "DOA meeting 08 Apr 14 - inputs from ICAO"	
A1-6	Mohammad Zaki Bin Ariffin	to refine the definitions of « service contract template (for an individual State) » and « framework service contract provisions with the telecommunication service provider »	9/4/2014	Open			
A1-7	all	all participants to review the proposal CRV Task Force - Task DoA_Agenda Item 5_7Mar2014_Input by Manjit and select the tasks needed from TCB	9/4/2014	Closed	9-Apr-14	Updated DoA 1 5	
A1-8	Chonlawit Banphawatthanarak/Manjit Singh	to share and consolidate CRV planning (CRVTFProject_rev03) with TCB	9/4/2014	Closed	9-Apr-14	CRVTFProject_rev06	
A1-9	Frederic Lecat	ICAO to send a. Management Service Agreement (MSA) template	07/03/14	Closed	10/3/2014	Sent out as Attachment D to the SOD of 07/03 Meeting	
A1-10	Manjit Singh/Pablo Lopez	To provide the total capped amount for Sealed Tender process	25/04/14	Open			
A1-11	Mohammad Zaki Bin Ariffin	Task leader to send an updated version of DOA	28/03/14	Closed	4/4/2014	DOA v1.3 sent out by email by F.Lecat	
A1-12	Frederic Lecat	To propose a template for user requirements	21/03/14	Closed	2/4/2014	Email [CRV] Information about Sealed Tender Process and User Requirements Process - CRV - proposed template for Sealed Tender user requirements.xlsx - CRV Project - Users' requirement Template -	
A1-13	Joe Knecht	to improve CONOPS' section on security and circulate it to all participants, with deadline for comments 4/4/14	28/03/14	Closed	28/03/14	Document APAC CRV Con Ops V0 2	
A1-14	all	to send out comments to Joe Knecht about CONOPS	4/4/2014	Closed	2/4/2014	Document APAC CRV Con Ops V0 2 - FL	
A1-15	Chonlawit Banphawatthanarak	draft material including a list of topics/list of questions will be provided by Chonlawit to start the RFI document	20/05/14	Open			Initial due date is 28/03/2014 Should be closed by the end of ACSICG/1 Target date of 20/05/2014
A2-1	all	to send out comments to Joe Knecht about CONOPS V0 3,end of section 2, and sections 3 and 4	21/4/14	Closed	21-Apr-14		
A2-2	Joe Knecht	to consolidate the CONOPS document and post it to ACSICG/1 meeting	30/4/14	Closed	9/5/2014	WP/08 USA for CRV TF/2	
A2-3	all	to send out comments to Mohammad Zaki Bin Ariffin about DOA v 1.5	21/4/14	Closed	21-Apr-14		
A2-4	Joe Knecht	CONOPS Task Leader to incorporate relevant information from WP/03 in the CONOPS and refer to OOG rules and policies document for OOG organisational matters	20/6/14	Open			
A2-5	Mohammad Zaki Bin Ariffin	DOA Task Leader to enable both models of H24/7 support in DOA and refer to OOG rules and policies document for OOG organisational matters	5/12/2014	Open			
A2-6	Chonlawit Banphawatthanarak, Joe Knecht	based on WP/03, develop initial set of OOG rules and policies document	16/1/15	Open			
A2-7	Frederic Lecat	to send out a letter to APAC States/Administrations inviting for comments on MSA before 27 June 2014	27/6/14	Open			
A2-8	Hoang Tran	A Request for Information (RFI) for CRV be prepared and published on ICAO APAC website States/before August 2014 advertising the CRV project and requesting technical and commercial information to the Telecommunication Service Providers.		Open			
A2-9	Frederic Lecat	Secretariat to seek experience and policies of PENS as to how to include additional network users in the network.	5/9/2014	Open			
A2-10	Mohammad Zaki Bin Ariffin, Joe Knecht	to update DOA and CONOPS regarding the inclusion of additional network users in CRV such as airports, air operators etc.	18/9/2015	Open			
A2-11	Frederic Lecat	ICAO to coordinate the communication on CRV with CANSO and States/Administrations (due date: 30 May 14) and possibly provide a link to the RFI on the ICAO APAC RO website.	30/05/14	Open			

	Raised	Probability	Severity	Hazard	Impact	Mitigation	Comment
R1	15-Jan-14	Likely	Severe	Draft DOA not endorsed by APANPIRG/25	Major delay generated for final delivery of CRV implementation (1 year).	R1-1	
R2	29-Apr-14	Remote	Severe	Some parties having signed the DOA but not able to pay their share	Major delay generated for final delivery of CRV implementation (1 year).	No mitigation: it is accepted that TCB would not start the work at the expected date	Accept the delay as States would not cover the missing share(s)
R3	12-May-14	Remote	Severe	Too low number of Parties joining to fund the TCB procurement process	Project abandoned or major delay generated for final delivery of CRV implementation (1 year).(Procurement cannot be done with TCB support)	Way forward through draft conclusion/WP to APANPIRG/25	

ID	CRV Task	Task Name	Start	Finish	Predecessors
1	1	ACSICG/1	Mon 5/12/14	Fri 5/16/14	
2	2	CNS SG/18	Mon 7/14/14	Fri 7/18/14	
3	3	APANPIRG/25	Mon 9/8/14	Fri 9/12/14	
4	4	ACSICG/2	Mon 5/11/15	Fri 5/15/15	
5	5	CNS SG/19	Mon 7/13/15	Fri 7/17/15	
6	6	APANPIRG/26	Mon 9/14/15	Fri 9/18/15	
7	7	ACSICG/3	Mon 5/9/16	Fri 5/13/16	
8	8	CNS SG/20	Mon 7/11/16	Fri 7/15/16	
9	9	APANPIRG/27	Mon 9/12/16	Fri 9/16/16	
10	**10**	**CONOP**	**Tue 12/3/13**	**Fri 10/24/14**	
11	11	Draft CONOP	Tue 12/3/13	Fri 3/14/14	
12	12	Update CONOP from ACSICG/1	Mon 5/19/14	Thu 7/10/14	1
13	13	Update CONOP from CNS/18	Mon 7/21/14	Mon 8/11/14	2
14	14	Refine CONOP after APANPIRG	Mon 9/15/14	Fri 10/24/14	3
15	**15**	**DoA**	**Tue 12/3/13**	**Mon 2/12/18**	
16	16	Draft DoA	Tue 12/3/13	Fri 1/17/14	
17	17	Funding Cost Assessment	Mon 1/20/14	Fri 5/9/14	16
18	18	Update DoA from ACSICG/1	Mon 5/19/14	Thu 7/10/14	1
19	19	Update DoA from CNS/18	Mon 7/21/14	Tue 8/12/14	2
20	20	Finalize DoA (articles Stage 1) for Signature	Mon 9/15/14	Fri 10/24/14	3
21	21	Sign DoA (Stage 1)	Mon 10/27/14	Fri 6/5/15	20
22	22	Finalize DOA (articles Stage 2) for Signature	Tue 12/2/14	Mon 11/7/16	20,33,62FF
23	23	Sign DoA (Stage 2)	Tue 11/8/16	Mon 2/12/18	22,62,9
24	**24**	**CBA**	**Tue 12/3/13**	**Thu 4/30/15**	
25	25	Data Collection (Including State Letter)	Tue 12/3/13	Fri 2/14/14	
26	26	Draft CBA for ACSICG/1	Mon 2/17/14	Fri 4/25/14	25
27	27	Data Collection All states	Mon 4/28/14	Wed 12/31/14	26
28	28	Update CBA for ACSICG/2 from RFI	Mon 2/16/15	Thu 4/30/15	34
29	**29**	**RFI**	**Mon 3/17/14**	**Fri 2/13/15**	
30	30	Draft RFI	Mon 3/17/14	Fri 7/11/14	11
31	31	Release of RFI	Mon 7/14/14	Fri 8/1/14	30
32	32	Waiting Response	Mon 8/4/14	Fri 10/24/14	31
33	33	RFI Close	Fri 10/24/14	Fri 10/24/14	32
34	34	Review and Process RFI	Mon 10/27/14	Fri 2/13/15	33,1,26
35	**35**	**RFP**	**Tue 4/1/14**	**Fri 9/11/15**	
36	36	Gather State Information	Mon 2/16/15	Fri 4/17/15	14,34
37	**37**	**Generate Requirements**	**Tue 4/1/14**	**Fri 4/17/15**	
38	37-a	Make User Requirement Template	Tue 4/1/14	Mon 4/28/14	
39	37-b	Make Preliminary Safety case	Tue 4/29/14	Mon 12/8/14	38
40	37-c	Make user Requirements	Tue 5/20/14	Fri 4/17/15	
41	38	Determine Selection Process	Mon 6/8/15	Tue 7/7/15	21,40
42	39	Determine Awarding Process	Wed 7/8/15	Fri 8/7/15	41
43	40	Update APANPIRG/26 on RFP and Annex B	Mon 8/10/15	Fri 9/11/15	42
44	**41**	**TCB Process**	**Mon 5/12/14**	**Fri 11/11/16**	
45	42	Funding Preparation	Mon 5/12/14	Fri 4/10/15	17
46	43	Funds are ready	Fri 4/10/15	Fri 4/10/15	45
47	**44**	**TCB Requirement Reviews and Packaging**	**Mon 6/8/15**	**Fri 7/31/15**	**21,37,46**
48	44-a	(a) Review the technical specifications	Mon 6/8/15	Fri 6/26/15	40
49	44-b	(b) Develop the evaluation criteria	Mon 6/29/15	Fri 7/10/15	48
50	44-c	(c) Prepare tender documents	Mon 6/8/15	Fri 7/31/15	
51	**45**	**TCB Publication of Sealed Tender**	**Mon 6/8/15**	**Fri 8/7/15**	
52	45-d	(d) Identify suitable suppliers	Mon 6/8/15	Fri 7/3/15	48SS
53	45-e	(e) Advertise Sealed Tender (ST)	Mon 8/3/15	Fri 8/7/15	52,50
54	**46**	**Consultation & ST Response**	**Mon 8/10/15**	**Fri 2/26/16**	**53**
55	46-f	(f) Coordinate site surveys	Mon 8/10/15	Fri 10/30/15	
56	46-g	(g) Handle tender clarifications	Mon 11/2/15	Fri 1/22/16	55
57	46-h	(h) Face to Face meeting with RT	Mon 2/22/16	Fri 2/26/16	56FS+1 mon
58	**47**	**Selection**	**Mon 5/23/16**	**Mon 8/15/16**	**57FS+3 mons**
59	47-i	(i) Carry out a preevaluation and evaluation meetings;	Mon 5/23/16	Fri 8/12/16	
60	48-l	(l)Notify selection to supplier	Mon 8/15/16	Mon 8/15/16	59
61	**49**	**Contract preparation**	**Tue 8/16/16**	**Mon 11/7/16**	**60**
62	49-k	(k) Prepare Service Contract;	Tue 8/16/16	Mon 11/7/16	
63	49-j	(j) Participate as a technical advisor to the CRV Task For	Mon 6/8/15	Fri 11/11/16	
64	**50**	**Implementation Plan**	**Tue 5/24/16**	**Mon 11/7/16**	
65	51	Draft Implementation Plan	Tue 8/16/16	Mon 11/7/16	58
66	52	OOG Setting Up and Staffing	Tue 5/24/16	Mon 11/7/16	65FF
67		Start Individual Service Contracts	Tue 11/8/16	Tue 11/8/16	62



Asia-Pacific Common Regional VPN

Template for Sealed Tender Users' requirements

"HOW TO" – 21/03/14

This guidance is made to help Pioneer States of CRV project to draft the Sealed Tender provisions.

Each requirement shall use the verb "SHALL".

To expedite the definition of requirement, all requirements should be handled through the proposed spreadsheet.

Each one of the columns of the spreadsheet is defined as follows:

Reference: gives a unique reference to each one of the provisions (requirements or information Statements). References are automatically generated in the spreadsheet.

Category

Technical (T) requirements or information statements may belong to following categories:

- **Volumetry**: CRV Pioneers to state here Requirements or Information Statements about current and future type and volume of operational data to be conveyed at a particular date (example: 2016), documented as a flow matrix. Current bandwidths are given as Information Statement, whilst future volume needs may be given as Requirement or Information Statement.

- **Routing and delivery:** CRV Pioneers to state here Requirements or Information Statements about routing policy/delivery commitment expected from the Service Provider

- **Users' Interface**: CRV Pioneers to state here Requirements or Information Statements about technical interface between the Service Provider and User's side

- **RCP- availability**: CRV Pioneers to state here Requirements or Information Statements about required availability, concerning or not a specific type of application data, expected from the Service Provider, expressed as a formula, and which is to be measured between two or more interfaces with user ("end-to-end" from the Service Provider's perspective)

- **RCP- continuity**: CRV Pioneers to state here Requirements or Information Statements about required continuity, concerning or not a specific type of application data, expected from the Service Provider, expressed as a formula, and which is to be measured between two or more interfaces with user ("end-to-end" from the Service Provider's perspective)

- **RCP- integrity**: CRV Pioneers to state here Requirements or Information Statements about required integrity, concerning or not a specific type of application data, expected from the Service Provider, expressed as a formula, and which is to be measured between two or more interfaces with user ("end-to-end" from the Service Provider's perspective)

- **Safety**: CRV Pioneers to state here Requirements or Information Statements about safety, as derived from a higher level safety case

- **Security**: CRV Pioneers to state here Requirements or Information Statements about security expected from the Service Provider. Note that any security provision expected from another Party, if any, should not be stated here, but in the DOA.

- **Priority handling**: CRV Pioneers to state here Requirements or Information Statements about policies and mechanisms for handling priorities of application data transportation, so as to prevent any congestion, or in case of actual congestion. This may apply to network resources reservation or delaying/discarding of data according to pre-established policies. A major example is the use of Class of Services and Quality Of Service.

- **Monitoring**: CRV Pioneers to state here Requirements or Information Statements about the monitoring facilities/service expected from the Service Provider, or interface with users' monitoring facilities.

- **Billing**: CRV Pioneers to state here Requirements or Information Statements about the billing facilities/service expected from the Service Provider, or interface with users' billing facilities, if any.

Service (S) requirements or information statements may belong to following categories:

- **Implementation management**: CRV Pioneers to state here Requirements or Information Statements about how the Service Provider shall handle creation, testing, migration, upgrades, termination of any service

- **Performance Management** (review, troubleshooting, decision making): CRV Pioneers to state here Requirements or Information Statements about the management by the Service Provider of the performance of any service.

- **Configuration Management** (review, troubleshooting, decision making): CRV Pioneers to state here Requirements or Information Statements about the management by the Service Provider of the configuration of any service. *Example: quarterly review of and report on a physical configuration between two points for the purpose of preventing any common failure mode*.

- **Fault Management** (preventive maintenance, troubleshooting, decision making): CRV Pioneers to state here Requirements or Information Statements about what is expected from the Service Provider to prevent any fault to occur and after a fault has occurred.

- **Security Management** (policies enforcement, authorization, troubleshooting, decision making): CRV Pioneers to state here Requirements or Information Statements about security

- **Contract Management:** CRV Pioneers to state here Requirements or Information Statements about how the Service Provider is to handle the contract during its execution phase. This may relate to sales invoices, purchase orders or change management of the contract.

Technical (T) - Service (S) – General (G): CRV Pioneers to indicate here if the Requirement or Information Statement relates to Technical matters, to the Service provision by the Service Provider or to General matters. As examples: choose T for any technical requirement, choose S for a

Requirement (R) – Optional Requirement (OR) - Information statement (IS): CRV Pioneers to indicate here if the provision shall be considered by the bidders as a requirement (SHALL comply), as an optional requirement (Bidders to indicate if they will comply, which may give them an advantage) or as an information (no obligation to comply).

Number: CRV Pioneers to allocate initially numbers from 10 to 10 (example: 10, 20, 30 etc) to ease future insertion of provisions

Wording of Information Statement or Requirement: the Information Statement or Requirement itself

Note: complements the Information Statement or Requirement itself. If it complements a requirement, the note has also a status of requirement, and likewise if it complements an Information Statement the note has a status of information as well.

External reference (annex, attachment, etc): indicates whether there is and where to find an external reference. If it complements a requirement, the external reference has also a status of requirement, and likewise if it complements an Information Statement the note has a status of information as well.

Questions / Comments: tracks questions and comments from CRV Pioneers during the CRV review process

Reply / Comments: tracks replies and comments from CRV Pioneers during the CRV review process

Status of wording (draft/final): tracks the status of wording regarding the RFI process

Will be published in RFI (yes/no): tracks if the item should be part of RFI documents or not

Feasibility assessment (OK/Partial/NOK): in case it was published in RFI, gives the feedback from bidders

Amendment needed after RFI? (yes/no): tracks if some rewording is needed considering the feedback from bidders

Final Wording (after RFI) the Information Statement or Requirement itself, after being reworded according to RFI's feedback

Note: complements the Information Statement or Requirement itself, after being reworded according to RFI's feedback. If it complements a requirement, the note has also a status of requirement, and likewise if it complements an Information Statement the note has a status of information as well.

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Initial drafting								CRV review process				Feedback from Request for information			
Reference (generated by Excel)	Category	Technical (T) - Service (S) - General (G)	Requirement (R) - Optional Requirement (OR) - Information statement (I)	Number	Wording of Information Statement or Requirement	Note	External reference (annex, attachment, etc)	Questions / Comments	Reply / Comments	Status of wording (draft/final)	Will be published in RFI (yes/no)	Feasibility assessment (OK/Partial/NOK)	Amendment needed after RFI?	Final Wording (after RFI)	Note
RCP- availability-T-R20	RCP- availability	T	R	20	The probability of availability of the CRV network for flight plan data shall be not less than 99.9%, averaged over 1 month period between 2 user's interfaces					draft	yes				
RCP- availability-T-R30	RCP- availability	T	R	30	The Service Provider shall ensure that in the CRV network design, any pair of users' interfaces can communicate via at least 2 dissimilar physical paths. Dissimilar paths means 2 physical paths not having any part in common.	This is to prevent any common failure mode at the physical level, so that routing algorithms can immediately establish an alternative path in case of link disruption.				draft	yes				
Volumetry-T-I10	Volumetry	T	I	10	The flow matrix between the Pioneer States as of March 2014 is as provided in Annex 2		Annex 2 - March 2014 flow matrix between 14 States of Asia Pacific			final	yes				
Configuration Management-S-R10	Configuration Management	S	R	10	The Service Provider shall conduct a periodic review of the physical configuration between any two users' interfaces for the purpose of preventing any common failure mode. Frequency of the review shall not be less than once every quarter.					draft	yes				
Configuration Management-S-R20	Configuration Management	S	R	20	The Service Provider shall conduct a periodic review of the physical configuration between any two users' interfaces for the purpose of preventing any common failure mode. Frequency of the review shall not be less than once every quarter.					draft	yes				
Configuration Management-S-R30	Configuration Management	S	R	30	The Service Provider shall deliver a quarterly report on physical configuration between any two users' interfaces of the CRV network					draft	yes				
Contract management-G-R110	Contract management	G	R	110	The Service Provider shall present its proposal as a catalog of services clearly identifying what are the requirements they comply with					draft	no				
Contract management-G-R20	Contract management	G	R	20	Before signing any Individual Contract with any of the parties as listed in Annex 1, the Service Provider shall make sure that this Party has signed the Document of Agreement		Annex 1 - List of potential Parties and associated geographical locations			draft	no				
Security Management-T-R10	Security Management	T	R	10	The Service Provider shall be able to apply a set of hierarchised security policies and principles in an homogeneous way over all nodes of the CRV network					draft	yes				
User's interface-T-R10	User's interface	T	R	10	The Service Provider shall implement a standardised interface at each connection point interfacing with the users. This interface is defined in Annex 3		Annex 3 - Standardized Users' interface			draft	yes				
User's interface-T-R20	User's interface	T	R	20	In case one of the Parties listed in Annex 1 and wishing to become a Party cannot comply against Annex 3, a dedicated process shall be conducted between the OOG coordinator, this Party and the Service Provider to define temporary adjustments to the interface.					draft	yes				
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CRV TF/2
Appendix L to the Report

Advertise CRV to CANSO

Communication

(Reviewed by CRV TF/2)

Asia-Pacific aeronautical Common Regional Virtual Private Network (CRV)

Title

An Asia-Pacific aeronautical network: CRV is planned for end 2016
- a wholly dependable and reliable communications infrastructure for aeronautical communications in Asia Pacific and with other ICAO regions, facilitating the Global Air Navigation Plan (GANP 4th Edition) B0-FICE, B0-NOPS, VoIP and B1-SWIM modules

When title is clicked:

- The network is an Asia-Pacific-Region-wide Internet Protocol (IP) communication network.
- The network is an upgrade from a current point-to-point communication infrastructure employed in APAC.
- The network will utilize a private commercial network from a single Communication Service Provider.
- The network will initially carry Air Traffic Service Message Handling System (AMHS) data and potentially other types of data such as voice over IP.
- The network will be a fundamental foundation for the reliable and secured support of current and future ATM information services such as inter center communications, sharing of surveillance data, exchange of Air Traffic Flow Management data, System Wide Information Management (SWIM), etc.
- Start of operations is planned for end 2016, if confirmed by APANPIRG

The Second Meeting of the Common Regional Virtual Private Network Task Force (VPN)
Of APANPIRG (CRV TF/2)
Seoul, Republic of Korea (12 May 2014)

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Attachment 2 to the Report

International Civil Aviation Organization

THE SECOND MEETING OF THE COMMON REGIONAL VIRTUAL PRIVATE NETWORK TASK FORCE (CRV TF/2) OF APANPIRG

Seoul, Republic of Korea, 12 May 2014

LIST OF WORKING AND INFORMATION PAPERS

WP/IP/ SP No.	Agenda	Subject	Presented by
		WORKING PAPERS	
WP/1	-	Provisional Agenda	Secretariat
WP/2	2, 4 & 5	CRV User Requirements	Secretariat
WP/3	2	Proposed Operational Oversight Group (OOG) Concept	Thailand and Secretariat
WP/4	3	Cost Benefit Analysis (First Iteration)	Japan, India, Australia and Secretariat
WP/5	2, 4, 5	CRV Project Activities since CRV TF/1 and for the next Period (May 14 – October 14)	Thailand and Secretariat
WP/6	2	Consideration for RFI Activities	Thailand and Secretariat
WP/7	2	Draft Management Service Agreement (MSA) for CRV Procurement	Secretariat
WP/8	5	Common Regional Virtual Private Network (CRV) Concept of Operations	USA
WP/9	2	Participation of Various Stakeholders in the Proposed Common Regional Virtual Private Network (CRV) to Serve the Asia/Pacific Region	India
WP/10	6	Advertising CRV Initiative to CANSO	Secretariat
WP/11	2	Common Regional Virtual Private Network (CRV) Multinational Document of Agreement (DoA)	Singapore
		INFORMATION PAPERS	
IP/1	-	Meeting Bulletin	Secretariat
IP/2	6	IP-VPN Ground/Ground Communication Network Using Commercially Available MPLS Network	India

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