International Civil Aviation Organization

MID Region ATM Enhancement Programme Steering Committee

Second Meeting (MAEP SC/2)
(Cairo, Egypt, 20-22 October 2015)

Agenda Item 2: MAEP Projects/Working Packages

AERONAUTICAL COMMON REGIONAL VIRTUAL PRIVATE NETWORK PROGRAMME (CRV)

(Presented by Secretariat)

SUMMARY

This paper aims at presenting the CRV programme (aeronautical Common Regional Virtual private network) conducted in the Asia Pacific Region to the MAEP SC and opportunities offered, along with cost and benefit considerations.

Action by the meeting is at para 3.

1. INTRODUCTION

1.1 During the Fourth Inter-Regional Co-ordination Meeting (IRCM/4) on Interface Issues between the Asia/Pacific (APAC), European and North Atlantic (EUR/NAT) and Middle East (MID) Regional Offices of ICAO held in Bangkok, Thailand from 14 to 16 September 2015, it was highlighted that the MID Region was considering project on regional IP (MID IP network) as one of the candidate projects of the MID ATM Enhancement Programme (MAEP). In that connection CRV was identified as a programme potentially beneficial for the ICAO MID Region.

1.2 As a follow-up to an action raised on the matter, this paper aims at presenting the CRV programme (aeronautical Common Regional Virtual private network) conducted in the Asia Pacific Region to the MAEP SC and discusses more specifically:

- What is CRV?
- Inception of CRV
- Why CRV?
- Implementation challenges initially perceived
- Programme management and current progress
- Cost benefit analysis
- Safety preliminary analysis
- Modalities for interregional connections with current PENS and future MID networks
- Possible options with cost benefit considerations for the MID Region.

2. DISCUSSION

What is CRV?

2.1 CRV can be defined under different angles as a task force, a programme, and an aeronautical service, part of Aeronautical Fixed Services (AFS).

2.2 CRV is a task force that was created end 2013 under decision 24/32 of APANPIRG. It has become a programme conducted by the Task Force, with programme management principles, including risk management. It will expectedly become a safe and secured IP-based transportation service offered to CRV users from 2017 onwards through a common contractual framework. This common contractual framework will be established in 2016 if the ongoing Sealed Tender process successfully selects a best and final offer.

2.3 CRV Users are expected to establish individual contracts based on the common provisions.

2.4 The ongoing Sealed Tender process makes it possible for all MID States, and more users, to join the initiative if the conditions are met for such a decision.

Inception of CRV

2.5 On behalf of Australia, Fiji, Hong Kong China, Japan, New Zealand, Republic of Korea, Singapore and Thailand, USA presented a proposal in 2013 for an IP VPN using a private commercial network to provide service for Air Traffic Service Message Handling System (AMHS) and possible future IP-based services.

2.6 Currently, Aeronautical Fixed Telecommunication Network (AFTN) and Air Traffic Service Message Handling System (AMHS) services in the Asia/Pacific Region operate over point-to-point international leased circuits. Such bilateral point-to-point circuits would not be able to support dynamic routing for AMHS or a true System Wide Information System (SWIM) environment.

2.7 A dedicated, common network operated by a service provider was an approach to be considered 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).

2.8 A preliminary finding concluded that using an IP VPN could result in 30% cost saving and significant additional bandwidth when compared to point-to-point circuits. It was determined that the establishment of such a network would require careful consideration of all issues involved as well as the evaluation of common network proposals as compared to the current point-to-point configuration.

2.9 Accordingly, the APANPIRG/24 meeting adopted the following decision in June 2013:

> *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.*

Why CRV? Global objectives (GANP), ANC/12 recommendations and (inter)regional challenges

2.10 CRV is a facilitator for GANP module B0-FICE, and an enabler (a **must have**) for the GANP modules B1-SWIM, B1-DATM. CRV is in line with the technological roadmap set forth in the GANP and will facilitate the sharing of surveillance data and enable the transition to VoIP communications.

2.11 In many other places, such an enabler already exists:

- In EUR Region the Pan-European Network Services (PENS) has been operational since 2012 supporting OLDI, VoIP, AMHS and SUR data exchanges. 22 States are connected to PENS.
- North American region has FAA Telecommunication Infrastructure (FTI) to support Canada and USA to distribute AFS data.
- South America has REDDIG and Caribbean region has MEVA.

2.12 From a user perspective, it was identified that the Asia/Pacific region should establish its own telecommunication network to **a/** address current issues and **b/** enable future enhancements.

a) Current arrangements between States to support AFS undergo the following issues:

- Half circuit arrangement between States 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
- Some States experience recurrent communication issues leading to ICAO deficiencies
- Incompatible network protocol does not support Extended Service as specified in ICAO Doc. 9880 and IPv6 addressing as specified in ICAO Doc. 9896
- New objectives as recommended by ICAO 12th Air Navigation Conference, such as System Wide Information Management (SWIM), are not possible
- Network security measures cannot be implemented, which leads many States to implement their own security measures and policy, adding to overall costs
- Different budget cycles and priorities between States make the synchronization of upgrades difficult and in turn limits the seamless distribution of Aeronautical Fixed Service (AFS) data.

b) Future expected enhancements are:

- Reduce telecommunication costs and standardize access to the network
- Enhance information security,
- Support new enhancements,
- Provide a dynamic network,
- Minimize coordination for network management and enhancement,
- Respond to Air Traffic requirements in a timely manner.

Implementation challenges initially perceived for a common infrastructure

2.13 Some of the challenges to be overcome by the CRV Task Force included the following:

- Building of common technical provisions
- Performance specifications
- Cost, including arrangement for division/allocation of cost
- Methods of billing and payment
- Process for contract award
- Responsibility for network administration
- Need for single point of contact to deal with service provider
- Handling of network service issues
- Network security issues
- Network redundancy issues
- Capacity for growth and expansion
- Required lead time for implementation
- Business Continuity / Disaster Recovery issues relating to the network
- Performance management, measurement, monitoring, reporting and control

Programme management and current progress

2.14 To address these challenges, the CRV is managed as a programme and relies on following principles:

- Benchmarking: the CRV TF first meeting benchmarked PENS and MEVA best practices, and coordination is being maintained with those programmes
- Risk management: management of top risks for the CRV programme, including enforcement of mitigation measures
- Establishment and maintenance of a detailed planning with all dependencies identified
- System Engineering: common technical provisions, including performance specifications, have been established following System Engineering methodology. A concept of operations and user requirements were defined.
- A cost benefit analysis with 2 iterations was done, including a Request For Information (market survey) to have the best possible picture of costs and benefits.

2.15 The current progress is reflected by the Revision 14.2 of the CRV Gantt chart placed at Appendix A. In summary, the project is on track as initially planned.

Cost benefit analysis and the issue of Users with poor terrestrial connectivity

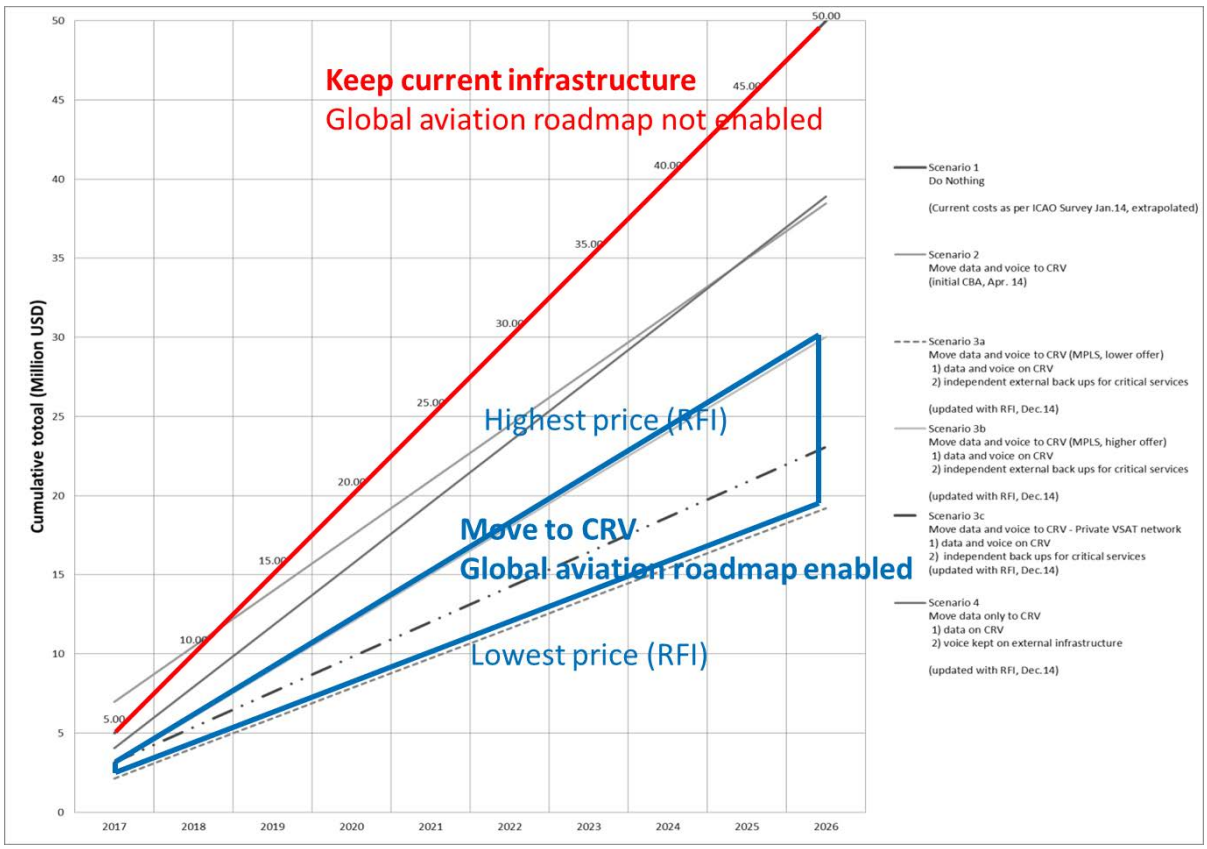
2.16 To compare the different options on a fair basis, the cost of moving to the CRV was estimated over the CRV lifecycle, 10 years (initial 5 years contract plus 5 years extension), including the initial one-off deployment costs to implement the CRV network.

2.17 4 scenarios were considered:

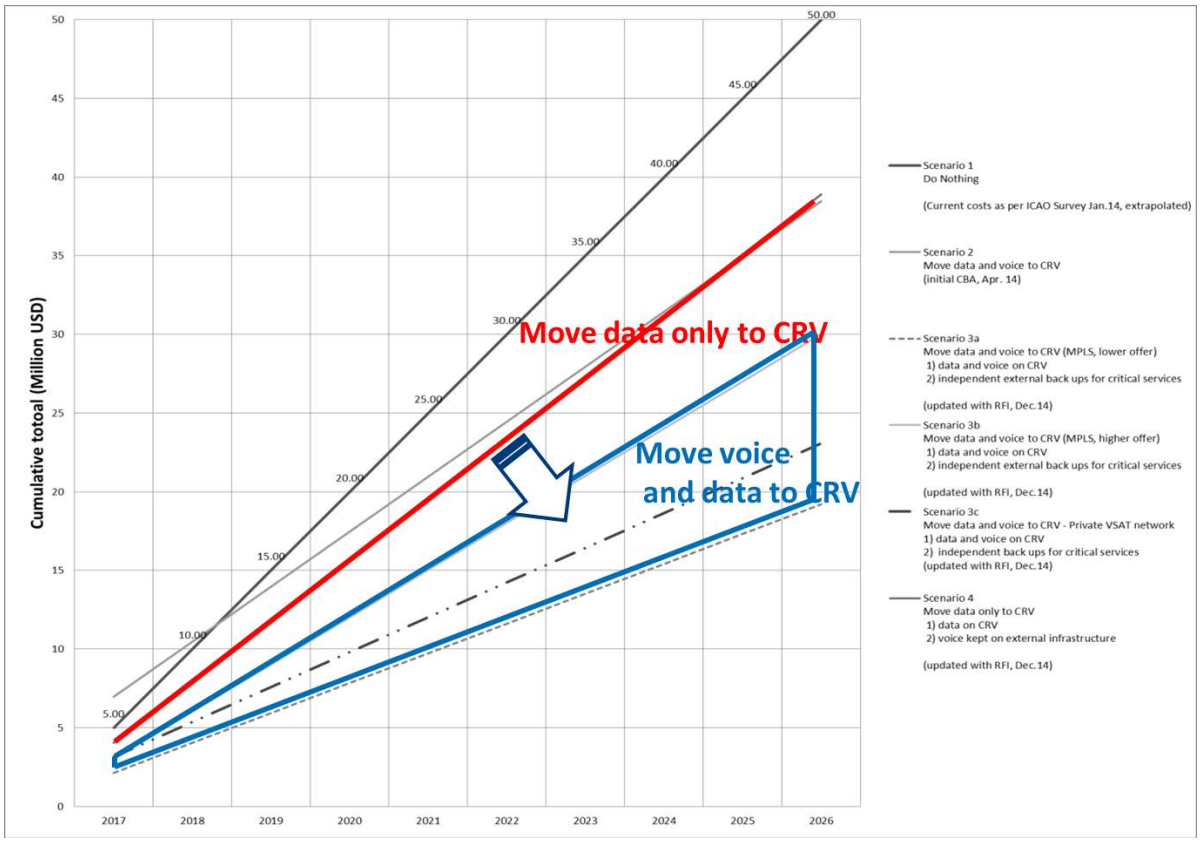
- **Scenario 1**: Do Nothing. Current costs as surveilled by ICAO survey in Jan. 14 for 15 States were extrapolated over 10 years (2017-2026)

- **Scenario 2**: implement CRV (first iteration of the CBA, with no input from market survey) over 10 years (2017-2026). Scenario 2 was then further refined based on a market survey (Request For information), leading to scenarios 3a, b, c and 4.
- **Scenario 3a**: Move data and voice to CRV (MPLS, lower offer): the cost estimations correspond to the lowest costs received during the RFI for an IP MPLS provision, 2Mbps, 15 states, 23 sites over 10 years (2017-2026)
- **Scenario 3b**: Move data and voice to CRV (MPLS, higher offer) the cost estimations correspond to the highest costs received during the RFI for an IP MPLS provision, 2Mbps, 15 states, 23 sites over 10 years (2017-2026)
- **Scenario 3c**: Move data and voice to CRV - Private VSAT network: the cost estimations correspond to the costs received during the RFI for a Private VSAT network 2Mbps, 15 states, 23 sites over 10 years (2017-2026)
- **Scenario 4**: the infrastructure currently used for voice by APAC States will be kept to maintain the redundancy between data communication and voice communication. The one-off costs and annual service costs quote the highest costs within the RFI. In addition, the current infrastructure used for voice services costs quote the annual services costs for voice services as per ICAO survey 14th Jan.

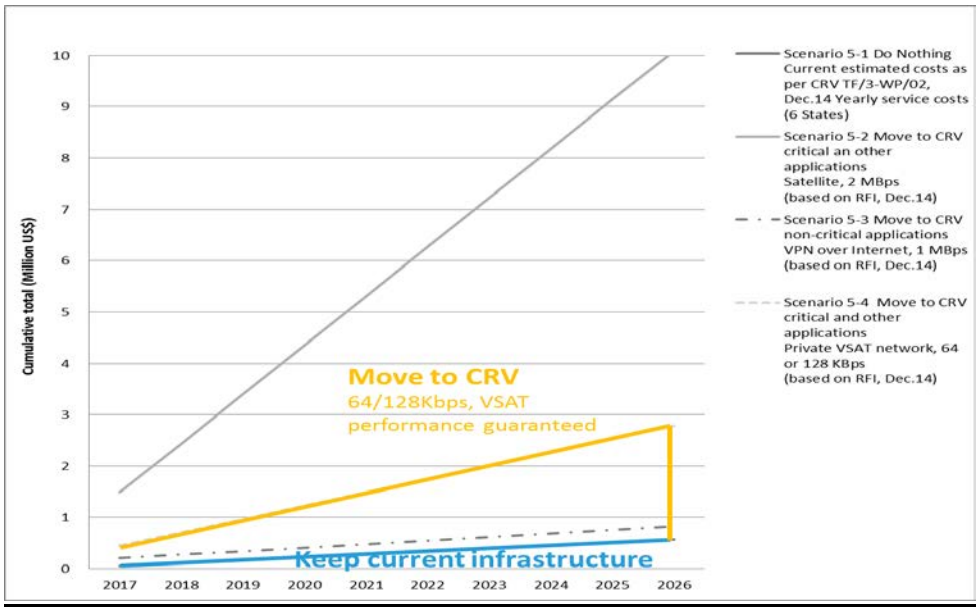
2.18 The outcome was that moving to CRV is the most favorable scenario based on ICAO Survey and RFI Market Survey:



2.19 Migrating voice would trim down the costs but may need independent backups. However costs associated with independent back-ups were assessed and included in the Cost benefit analysis. Considering that the migration of voice to the CRV network is highly cost efficient (it would result in a reduction of between 18% and 39.6% of the total cost of services as compared to the existing situation) but that it also requires the implementation of the necessary independent backups, the migration of applications should be monitored by an ad hoc group. CRV operations oversight group. It would additionally make sure that the CRV services are used in accordance with the plans:



2.20 For users with poor terrestrial connectivity the picture is quite different: Moving to CRV would probably increase costs for small Pacific States and where terrestrial connectivity is poor (last mile, backbone).



2.21 For those cases, and following the No Country Left Behind ICAO initiative, there would be a need for specific weighting in procurement/cost arrangements, and probably a different paradigm (VSAT network, owned or not).

2.22 In order to facilitate Administrations with negative CBA value to implement CRV project to achieve common benefits, the meeting encourage those Administrations in a position to do so, to work out cost arrangements with their counter parts. and meanwhile the following APANPIRG conclusion was adopted in July 2015:

Conclusion APANPIRG/26/32 – CRV Cost Arrangement Framework

That, noting that cost arrangements on current telecommunications exist between some States/Administrations and considering the result of the second iteration of the CRV Cost Benefit Analysis, APAC States/Administrations be advised to:

- *make their own local Cost benefit analysis as needed;*
- *start discussions of possible new or improved cost arrangement frameworks with other ICAO Member State(s)/Administration(s), based on the Request For Information results; and*
- *endeavor to establish arrangements for mid 2016.*

2.23 Coordination is also ongoing between ICAO and the World Bank (Pacific Aviation Investment Programme) to explore suitable arrangements for some of the Pacific Islands.

Safety preliminary analysis

2.24 A preliminary safety analysis was delivered and adopted by APANPIRG in Sep. 2015. It includes:

- a basic OSED (Operational Services and Environment Description), defining a map and high level characteristics of operational services (as per ICAO Doc 4444) and environments (separation minima, traffic density, airspace complexity) concerned by the applications/exchanges of data covered by CRV operations and define scope (people, equipment, procedures) of the safety preliminary analysis.
- Severity, Likelihood, Risk Index and Tolerability tables, including a quantified approach to allocate the safety requirements
- an OHA (Operational Hazard Analysis), which determined the worst possible cases for assessing the consequences of OH occurrence on operations, assess the severity of their consequences, and based on the severity, allocate safety objectives
- a PSSA (Preliminary System Safety Analysis), identifying plausible causes and barriers for the said OH and allocate safety requirements down to the CRV operations

2.25 The safety requirements relating to the provision of services by the CRV provider were then transferred to the procurement. The CRV provider shall bring the evidence that the requirements concerning CRV will be met. The transition to CRV being a change to the Air Navigation System, requirements allocated to ANSP will form a sound and common basis for the local safety cases that need to be performed in accordance with the Safety Management Systems of the different organizations.

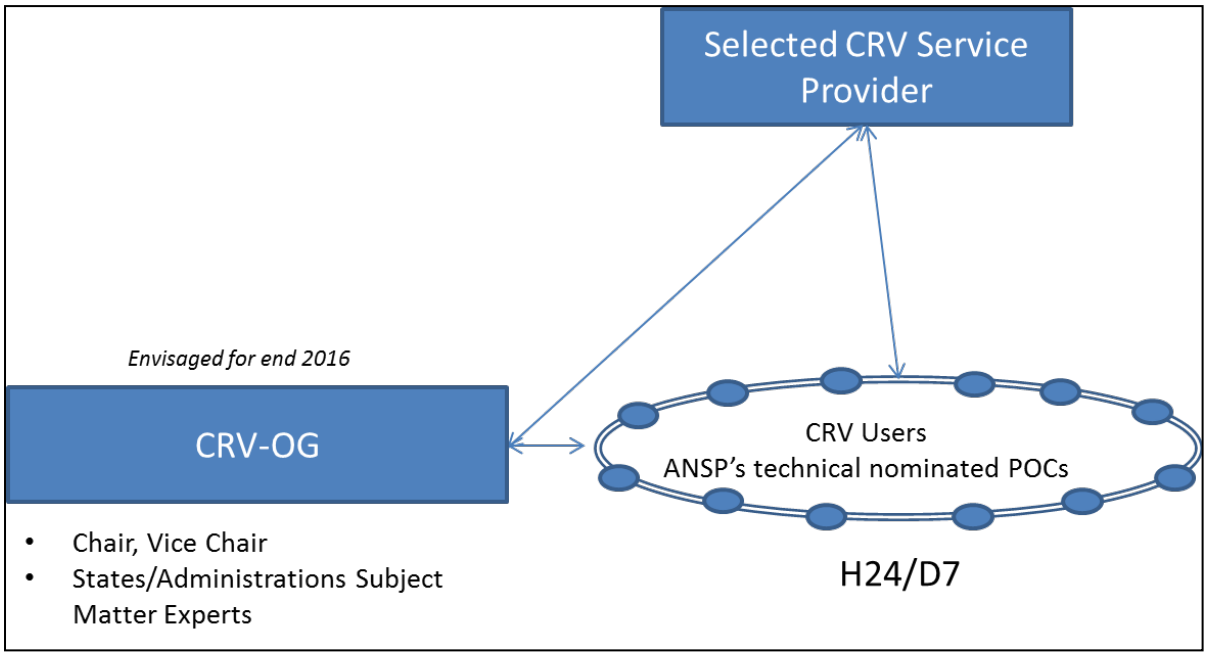
Procurement process

2.26 The CRV Task Force drafted the provisions of the CRV procurement. The final review was done in July 2015.

2.27 The Sealed Tender relies on ICAO Technical Cooperation Bureau services to ensure equity and fairness in the process.

2.28 In the stage 1 of the programme, 16 Pioneer States/Administrations have equally funded the assistance of an ICAO expert for ICAO procurement. 2 more potential States will join. These Pioneer States will form the evaluation committee that will rank the different bids. In the Sealed Tender evaluation, the scoring of the commercial proposal is based on a total cost of services (initial and recurrent costs) over 10 years

2.29 In the stage 2, a structure for managing the network once commissioned and interface with the supplier will be needed: CRV-OG (CRV Operations Group). All States/Administrations (and not only the Pioneers) are encouraged to join. States/Administrations will have to join CRV-OG before signing an Individual Service Contract with the selected supplier. Before starting the operations, CRV users will have to nominate their operations Point of Contact:



2.30 Based on the final common provisions, CRV future users will have to sign an individual service contract (based on a template) with the CRV supplier.

2.31 The supplier could be a single provider combination of Telecom. Service Providers. There will be no fees to pay with a local/national service provider, as CRV will offer END TO END service in the general case.

2.32 The tender package addresses:

- Management of the Network Design
- Customer Support Service, including the Service Desk Performance
- Optional services for Customer Service Desk/ Network Operations Center, Customer Service Desk proficient in aviation applications, Dedicated Network Operations Center
- Network Management to manage Network Performance and a contingency plan
- Implementation Management, including program management and quality Assurance, a system engineering approach,
- Configuration Management
- Monitoring and Reporting
- Fault Management
- Safety Management

- Security Management, with an optional authentication service based on a cooperative Public Key Infrastructure
- Training (initial/refresh, online/offline)
- Contract management, including dispute resolution, price Management, payment deduction, billing management

Modalities for interregional connections with current PENS and future MID networks

2.33 The recent CNS SG/19 Meeting in July 2015 agreed that ANSPs in the Asia/Pacific Region who have aeronautical fixed services with other ICAO Regions should consider the following options to replace their existing IPLs:

1) Invite counterparts in other ICAO Regions to join CRV; or
2) Join the respective ICAO Regional IP Network; or
3) Establish a bi-lateral agreement for a single telecommunication network vendor

2.34 To enable these options the CRV procurement includes all ICAO MID States as potential users, and also all existing connection points between APAC and other regions as follows:

ICAO MID Region

Bahrain	Bahrain Civil Affairs	Manama
Egypt	NANSC	Cairo
Iran	Civil Aviation Organization	Tehran
Iraq	CAA	Baghdad
Jordan	CARC	Amman
Kuwait	Directorate General of CA	Kuwait
Lebanon	CAA	Beirut
Libya	CAA	Tripoli
Oman	Public Authority for CA	Muscat
Qatar	CAA	Doha
Saudi Arabia	General Authority of CA	Jeddah
Saudi Arabia	General Authority of CA	Riyadh
Sudan	CAA	Khartoum
Syria	CAA	Damascus
UAE	General CA Authority	Abu Dhabi
Yemen	CA and Met Authority	Sanaa

Interregional connectivity

Russia	Interregional connection for AFTN between Beijing China and Far East Air Navigation" 680031, Matveevskoye Shosse, 28a Khabarovsk Russia	Khabarovsk
UK	Interconnection with Singapore	Fareham
South Africa	Interconnection with India	Johannesburg
Italy	Interconnection with Thailand	Rome

2.35 Additional information is requested regarding the sites of potential connection: point of contact (name/email/telephone), exact address including the building and technical room, latitude/longitude.

2.36 Interconnection with PENS will be worked out in 2016/2017 depending on the result of the CRV procurement.

2.37 Later on, any point of interconnection can be added to the contract.

Possible options with cost benefit considerations for the MID Region

2.38 Depending on the strategy followed by MID Region, different scenarios can be envisaged:

1. MID Region drives its own IP-based network project and uses CRV procurement framework for all regional and interregional connections.
2. MID Region drives its own IP-based network project and uses CRV procurement framework only for interregional connections along the major traffic flows.
3. MID Region drives its own IP-based network project and does not use at all the CRV procurement framework.

2.39 Costs and benefits are presented in the following table:

Scenario	Benefits	Costs/Drawbacks
1. MID Region drives its own IP-based network project and uses CRV procurement framework for all regional and interregional connections	Use a contractual framework already developed, gain 1 to 2 years on the implementation schedule for MID Region. Increases economy scales for all CRV users by using common resources (helpdesk, Network Operating Center) and harmonizes the network interface between the 2 Regions. Best possible integration of infrastructure between MID and APAC ICAO regions	Requirements are defined and cannot be changed. However they have been developed in quite a generic way that should meet MID States expectations. The Users Club (CRV-Operations Group) will be more difficult to manage. However experience has already been gained in the past with Interregional Task Forces and it is considered manageable. Webconferences could be used as necessary.
2.MID Region drives its own IP-based network project and uses CRV procurement framework for only interregional connections along the major traffic flows	Rationalizes the network interface between the 2 Regions The 2 regions implement their IP network at their own pace, almost independently MID region can tailor its requirements	Transition to an IP-based network in MID region will take 1 or 2 more years compared to scenario 1 No economy scale and duplicated processes (helpdesk, Network Operating Center duplicated, oversight of network operations between States) Procurement work is duplicated for ICAO (however lessons learnt from CRV will be given to ICAO MID)
3.MID Region drives its own IP-based network project and does not use at all the CRV procurement framework.	The 2 regions implement their IP network at their own pace, almost independently MID region can tailor its requirements	Transition to an IP-based network in MID region will take 1 or 2 more years compared to scenario 1 A bi-lateral agreement for a single telecommunication network vendor should be established to make the interconnection between the 2 IP networks The single telecommunication network vendor will be in monopoly No economy scale and duplicated processes (helpdesk, Network Operating Center duplicated, oversight of network operations between States) Procurement work is duplicated for ICAO (however lessons learnt from CRV will be given to ICAO MID)

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

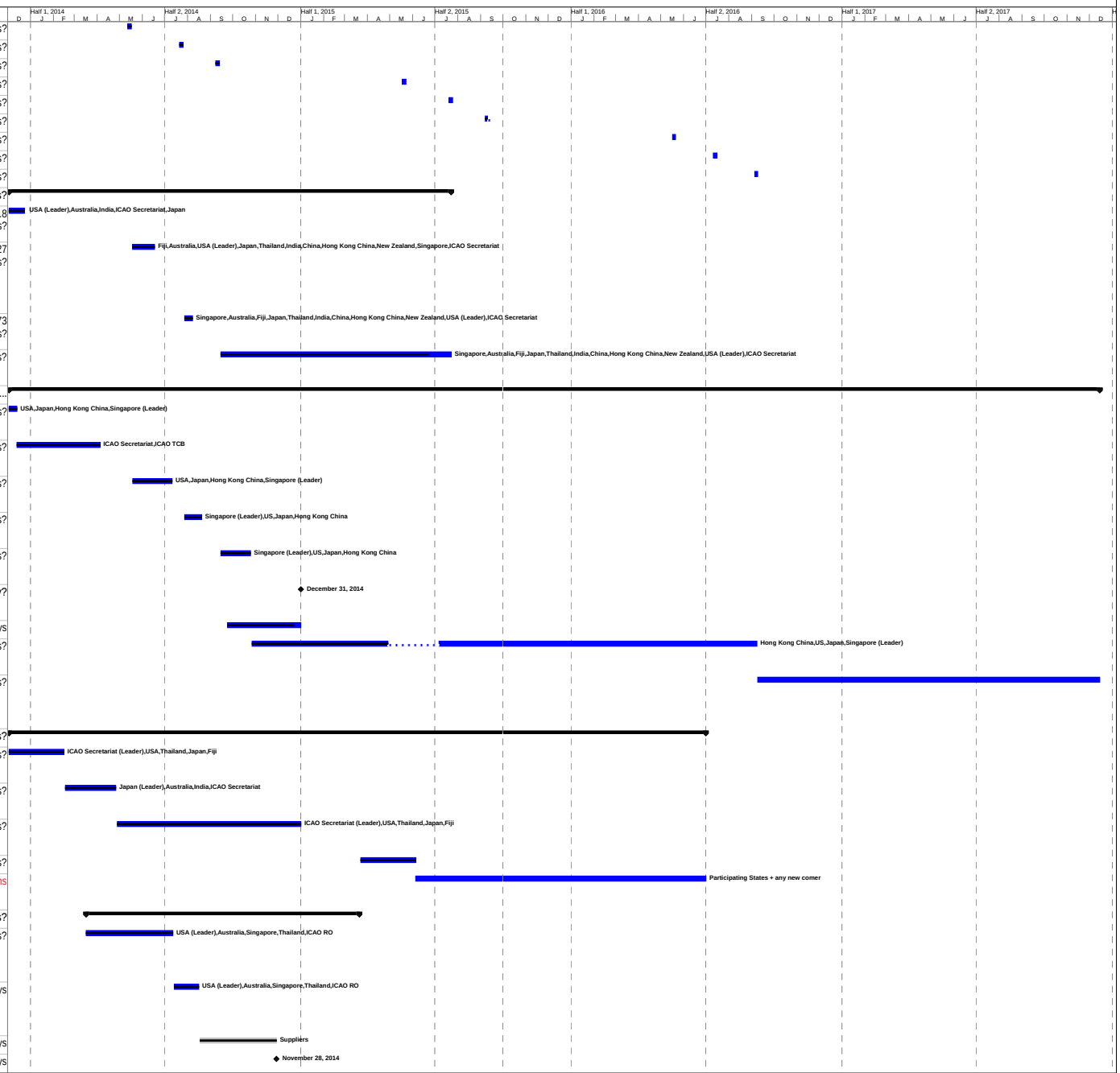
a) confirm the list of potential sites para 2.34, and provide additional information requested in para 2.35, noting that doing so no commitment is made at all as to whether services would be procured or not;

b) refine the costs and benefits developed in para 2.38 and 2.39, discuss what is the strategy favored by the MAEP SC and inform APANPIRG through ICAO secretariat accordingly; and

c) discuss any relevant matters as appropriate.

Thu 10/1/15

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 7/21/14	Fri 7/25/14		5 days?
3	3	APANPIRG/25	Mon 9/8/14	Fri 9/12/14		5 days?
4	4	ACSICG/2	Mon 5/18/15	Fri 5/22/15		5 days?
5	5	CNS SG/19	Mon 7/20/15	Fri 7/24/15		5 days?
6	6	APANPIRG/26	Mon 9/7/15	Fri 9/18/15		3 days?
7	7	ACSICG/3	Tue 5/17/16	Fri 5/20/16		4 days?
8	8	CNS SG/20	Mon 7/11/16	Fri 7/15/16		5 days?
9	9	APANPIRG/27	Mon 9/5/16	Thu 9/8/16		4 days?
10	10	CONOP	Tue 12/3/13	Wed 7/22/15		427 days?
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 7/28/14	Thu 8/7/14	2	8.73 days?
14	14	Refine CONOP after APANPIRG	Mon 9/15/14	Wed 7/22/15	3	223 days?
15	15	MSA/DoA	Tue 12/3/13	Thu 12/14/17		1053 da...
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 7/28/14	Tue 8/19/14	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	Wed 12/31/14	Wed 12/31/14		1 day?
22	21	Sign MSA (Stage 1)	Wed 9/24/14	Wed 12/31/14	3SS	71 days
23	22	Maintain the consistency between the sealed tender (TOR, TC, Best and Final Offer. temolate for Individual	Mon 10/27/14	Wed 9/7/16	20,35,69FF	439 days?
24	23	Adopt APANPIRG Conclusion for CRV-OG creation and keep updated with new Members	Fri 9/9/16	Thu 12/14/17	23,9,69	330 days?
25	24	CBA	Tue 12/3/13	Thu 6/30/16		673 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 3/23/15	Thu 6/4/15	36	54 days?
30	28-b	States/Adm. make their local CBA (based on RFI results)	Fri 6/5/15	Thu 6/30/16	29	14 mons
31	29	RFI	Mon 3/17/14	Fri 3/20/15		265 days?
32	30	Draft RFI	Mon 3/17/14	Fri 7/11/14	11	85 days?
33	31	Release of RFI	Mon 7/14/14	Fri 8/15/14	32	25 days
34	32	Waiting Response	Mon 8/18/14	Fri 11/28/14	33	75 days
35	33	RFI Close	Fri 11/28/14	Fri 11/28/14	34	0 days

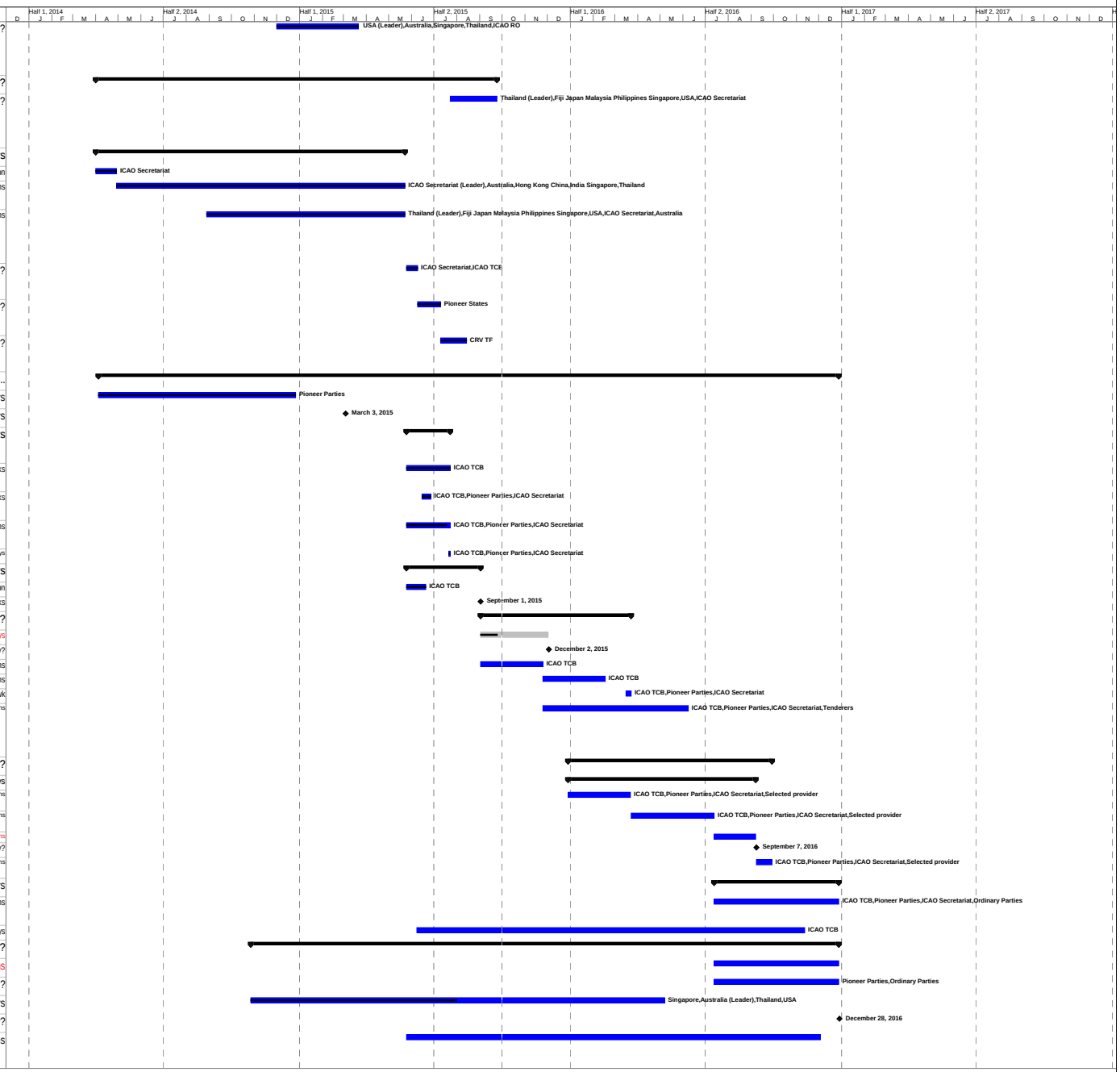


Project: CRV Project rev13 -250515 - b
Date: Thu 10/1/15

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

Thu 10/1/15

ID	CRV Task	Task Name	Start	Finish	Predecessors	Duration
36	34	Review and Process RFI	Mon 12/1/14	Fri 3/20/15	35,1,27	80 days?
37	35	RFP	Tue 4/1/14	Wed 9/23/15		387 days?
38	36	Gather State Information and distribute requirements to non Pioneer States	Thu 7/23/15	Wed 9/23/15	14,36	45 days?
39	37	Generate Requirements	Tue 4/1/14	Fri 5/22/15		299 days
40	37-a	Make User Requirement Template	Tue 4/1/14	Mon 4/28/14		1 mon
41	37-b	Make Safety Preliminary analysis- completed	Tue 4/29/14	Fri 5/22/15	40	13.95 mons
42	37-c	Make user Requirements - completed	Thu 8/28/14	Fri 5/22/15	41FF	9.56 mons
43	38	Determine Selection Process - completed	Mon 5/25/15	Mon 6/8/15	22,42	11 days?
44	39	Determine Awarding Process (evaluation plan) - completed	Tue 6/9/15	Thu 7/9/15	43	23 days?
45	40	Update APANPIRG/26 on Sealed Tender - completed	Fri 7/10/15	Thu 8/13/15	44	25 days?
46	41	TCB Process	Fri 4/4/14	Tue 12/27/16		712.5 da...
47	42	Funding Preparation	Fri 4/4/14	Fri 12/26/14	17	190 days
48	43	Funds are ready	Tue 3/3/15	Tue 3/3/15	47FS+25 d	0 days
49	44	TCB Requirement Reviews and Packaging	Mon 5/25/15	Wed 7/22/15	22,39,48	43 days
50	44-a	(a) Review the technical specifications - completed	Mon 5/25/15	Wed 7/22/15	42	8.6 wks
51	44-b	(b) Develop the evaluation criteria - completed	Mon 6/15/15	Fri 6/26/15	50	2 wks
52	44-c	(c)Prepare tender documents - completed	Mon 5/25/15	Wed 7/22/15		2.15 mons
53	44-d	Formal review of tender package- completed	Tue 7/21/15	Wed 7/22/15	52,42	2 days
54	45	TCB Publication of Sealed Tender	Mon 5/25/15	Tue 9/1/15		72 days
55	45-d	(d) Identify suitable suppliers - completed	Mon 5/25/15	Fri 6/19/15	50SS	1 mon
56	45-e	(e) Advertise Sealed Tender (ST)- completed	Thu 7/23/15	Tue 9/1/15	55,53	5.8 wks
57	46	Consultation & ST Response	Wed 9/2/15	Tue 3/22/16	56	145 days?
58		Wait for proposals from Tenderers - Q/R	Wed 9/2/15	Tue 12/1/15	56	65 days
59		Proposals from Tenderers	Wed 12/2/15	Wed 12/2/15	58	1 day?
60	46-f	(f) Coordinate site surveys	Wed 9/2/15	Tue 11/24/15		3 mons
61	46-g	(g) Handle tender clarifications	Wed 11/25/15	Tue 2/16/16	60	3 mons
62	46-h	(h) Face to Face meeting with RT (optional)	Wed 3/16/16	Tue 3/22/16	61FS+1 mon	1 wk
63	53	Establish Common Provisions (including CRV design and SLA)	Wed 11/25/15	Tue 6/7/16	61SS	7 mons
64	47	Selection	Tue 12/29/15	Wed 9/28/16	59	197 days?
65	47-i	(i) Carry out a preevaluation and evaluation r	Tue 12/29/15	Tue 9/6/16		181 days
66		Preevaluation CRV Pioneer States	Tue 12/29/15	Mon 3/21/16		3 mons
67		Evaluation (+optional F2F w/ bidders for final clarifications)	Wed 3/23/16	Tue 7/12/16	66,62	4 mons
68		ICAO approval process	Wed 7/13/16	Tue 9/6/16	67	2 mons
69	48-l	(l) Notify selection to supplier	Wed 9/7/16	Wed 9/7/16	67,68	1 day?
70	48-m	Minor adjustments	Thu 9/8/16	Wed 9/28/16	69	0.75 mons
71	49	Contract preparation	Wed 7/13/16	Tue 12/27/16	67	120 days
72	49-k	(k) Assist with Individual Service Contracts	Wed 7/13/16	Tue 12/27/16		6 mons
73	49-j	(j) Participate as a technical advisor to the CRV Ta	Mon 6/8/15	Fri 11/11/16		375 days
74	50	Implementation Plan	Mon 10/27/14	Tue 12/27/16		567 days?
75	51	Draft Implementation Plan	Wed 7/13/16	Tue 12/27/16	67	6 mons
76	52	CRV-OG preparation	Wed 7/13/16	Tue 12/27/16	75FF	6 mons?
77	53	Draft CRV-OG rules and procedures	Mon 10/27/14	Fri 5/6/16	23SS	400 days
78	54	Start Individual Service Contracts	Wed 12/28/16	Wed 12/28/16	72	1 day?
79	55	States/Adm. make their local safety case (based on CRV Prelim. analysis)	Mon 5/25/15	Fri 12/2/16	41	20 mons



Project: CRV Project rev13 -250515 - b
Date: Thu 10/1/15

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