



ICAO

International Civil Aviation Organization

**Third Meeting of the Surveillance Study Group
(SURSG/3)**

(Hong Kong China, 22– 24 March 2023)

Agenda Item 2: Review of outcome of relevant meetings

OUTCOME OF THE COMMON AERONAUTICAL VIRTUAL PRIVATE NETWORK OPERATIONS GROUP (CRV OG/11)

(Presented by the Secretariat)

SUMMARY

This paper presents the discussions and relevant outcomes on Eleventh Meeting of the Common aeRonautical Virtual Private Network Operations Group of APANPIRG (CRV OG/11).

1. INTRODUCTION

1.1 The Eleventh Meeting of the Common aeRonautical Virtual Private Network Operations Group of APANPIRG (CRV OG/11) was held from *1 to 3 February, 2023* in ICAO Asia and Pacific Regional Office, Bangkok, Thailand. The Meeting was attended by 65 participants from 19 Member States/Administration. The meeting report, working papers, information papers, and other resources can be accessed by following link:

<https://www.icao.int/APAC/Meetings/Pages/2023-CRV-OG11-.aspx>

1.2 This paper summarised relevant information and updates from the meeting.

2. DISCUSSION

2.1 The summary of discussion in the Meeting is given in following paragraphs.

Outcomes of CRV Governance Workshop – Sec (WP/16)

2.2 The CRV OG/11 meeting reviewed the outcomes of the ICAO Asia Pacific Idea Generation Workshop: *CRV Governance* held at the ICAO APAC Office, Bangkok, Thailand, on **31 January 2023**. The Workshop was attended by **41** participants from **13** States/Administrations.

2.3 A total of **Three (3)** presentations were delivered discussing REDDIG II (SAM Regional IP Network) governance structure by Regional Officer CNS, ICAO SAM Office, New PENS governance structure by PENS Management Unit Lead of EUROCONTROL, and CRV governance structure by CRV OG Co-Chair (Asia). The further sessions brainstormed the improvement of CRV governance to meet current requirements and future challenges. The Workshop report, presentations, and other resources can be accessed by following link:
<https://www.icao.int/APAC/Meetings/Pages/2023-CRV-Governance-Workshop.aspx>

2.4 The Workshop agreed to create the **CRV OG Ad-hoc Governance Group** for preparing and presenting the **potential CRV OG Governance model** to future CRV OG Meetings.

Australia, Japan, Jordan, Fiji, India, Hong Kong China, New Zealand, Singapore, Thailand, and USA volunteered to join the group, led by CRV OG Co-Chairs. It was agreed that the Terms of Reference (ToR) of CRV OG Ad-hoc Governance Group would be finalized by the existing CRV OG Ad-hoc Expert Group, planned to meet virtually on 20 April, 2023.

2.5 Additionally, Meeting concurred that the First Meeting of **CRV OG Ad-hoc Governance Group** should be organised as **In Person Meeting** to have an opportunity for detailed deliberation about the ToR of the group and future roadmap. The Meeting will be organised from **22-23 May 2023** with **ACSICG/10** Meeting planned to be held from **24-26 May 2023** for Member States convenience.

2.6 Fiji shared its offer to host the joint meeting of CRV OG Ad-hoc Governance Group and ACSICG/10 from 22-26 May 2023. The Meeting appreciated the generous offer and shared gratitude to Fiji. The Member States interested in joining the group in future were invited to share their interest with ICAO Secretariat by email. However, due to limited time to arrange for the meeting to host by Fiji, it was decided by ICAO APAC Office to organize the successive meeting of CRV OG Ad-hoc Governance Group and ACSICG/10 from 22-26 May 2023 in Bangkok, Thailand.

CRV OG Operations Manual Status - New Zealand (WP/03)

2.7 New Zealand presented the status of the current draft of the CRV OG Operations Manual. The CRV OG/11 Meeting was informed that since the publication of the CRV OG Operations Manual in April 2022, there have been many updates, including those coming from the CRV OG Ad Hoc Groups. The updates in different sections were explained in detail. The Meeting adopted the **Decision CRV OG/11/01 - Publish the updated APAC CRV Operations Manual (CRV OG OM v1.2)**.

2.8 The latest version of the CRV OG Operational Manual has been published on [ICAO APAC e-docs](#) under CNS, [ICAO APAC CRV Secure portal](#), and on the [CRV portal](#) hosted by Airways New Zealand.

2.9 Nepal suggested incorporating relevant guidance in the form of Process and Procedures into the CRV OG OM clarifying that Member States can request support of ICAO Secretariat and CRV OG for dispute resolution matters or other significant issues if arises. The CRV OG Ad-hoc Expert Group will discuss the possibility of adding such provisions and draft relevant clauses to add in CRV OG OM.

Outcomes of CRV OG Experts Ad-hoc Group Meetings – New Zealand (WP/09)

2.10 The paper presented the outcomes of the APAC CRV Ad-Hoc Expert Group discussions held last year after the CRV OG9. The Meeting noted that seven virtual Ad-hoc Meetings were held between CRV OG/9 organised from 25-27 January, 2022 till date, and one distinct Meeting was held with the SWIM Task Force task leads on 28 October, 2022. The outcomes of the Ad-Hoc Group Expert Group discussions on contract extension, upgrade/downgrade CRV circuits subscribed, different CRV Users and their joining process, and Package D+ formalization were presented, which were further reviewed in CRV OG/11 by separate working papers. Other topics, including the mandate of firewall, common Package review, chair's functions, and operations manual as a formal document, were discussed.

Update to CRV Implementation Plan – Singapore (WP/19)

2.11 The paper presented the proposed updates/editorial changes to the CRV Implementation Plan for Meeting review and adoption. The Meeting agreed to publish the CRV OG Implementation Plan and adopted the **Decision CRV OG/11/02 - Update to the CRV Implementation Plan**. The latest version of CRV OG Implementation Plan without restricted information has been published on [ICAO APAC e-docs](#) under CNS Section. The latest version of CRV OG Implementation

Plan has been uploaded on the [ICAO CRV Secure portal](#), and [CRV portal](#) hosted by Airways New Zealand.

ATN Documentation Tree Update – USA (WP/20)

2.12 The paper presented an update of **the Asia/Pacific regional ATN Documentation Tree**. The CRV OG/11 meeting deliberated the proposed APAC ATN Documentation Tree and various CRV documents suggested to be placed in the Tree. Supplementary consultation requirements with more Member States for further modifications and updates were sensed. The proposed ATN Documentation Tree provided in Appendix A to the Report was referred to as *the first snapshot of the Tree*, which required more deliberation. The Tree will be reviewed and updated by the ACSICG/10 Meeting to be held in May 2023. The ACSICG/10 Meeting will formulate the draft Decision to publish ATN Documentation Tree for CNS SG/27 consideration if required.

2.13 The Meeting agreed that the CRV OG Ad Hoc Expert Group will work on modifying relevant CRV documents and updating the CRV OG Operations Manual to ensure that any changes within CRV consider modifications required to the document tree.

2.14 As the current APAC ATN Documentation Tree uploaded on ICAO APAC Website was not updated for a long time, the ICAO Secretariat will take necessary action to update ATN Documentation Tree on the [ICAO APAC Regional Implementation Projects webpage](#) with the proposed first snapshot of the Tree that would be modified in future as more modifications would be made by ACSICG/CRV OG Meetings.

2.15 Pakistan questioned if, as of today, joining CRV is mandated by ICAO or if it is considered a recommended practice. ICAO Secretariat informed that the 54th Conference of Directors General of Civil Aviation, APAC Region, held in 2017 created an **Action Item 54/20**, which sets and monitors **2020 as the target for CRV implementation for all ANSPs**, to optimize each individual cost benefit analysis, and note that failing this, pessimistic assumptions might threaten the roll-out of CRV initiative. In addition, CRV Implementation is **one of the Beijing Declaration commitments** done at Ministerial Conference in Beijing in 2018. By the declaration, Member States committed to join CRV **by the end of 2020**. Additionally, for past few years, various APANPIRG Meetings have encouraged Member States to join CRV as soon as practicable. Moreover, as per APANPIRG Conclusion APANPIRG/33/7, States should join CRV **by 31 December 2023**. Therefore, implementation of CRV can be considered a mandatory requirement by APANPIRG. In future, the non-implementation of CRV may also be considered an air navigation deficiency.

Risk Assessment framework for CRV OG – New Zealand (WP/22)

2.16 The paper presented a risk assessment framework for CRV. Over years of CRV operations, various installations and CRV processes issues have been encountered. These issues can be considered as the risk impacting availability of CRV network and services. The CRV OG/11 meeting noted that these risks were documented in the Airways New Zealand risk evaluation template, which can be accessed on the portal [APAC CRV - Risk Register.docx](#), which has criteria crafted to suit and reflect Airways New Zealand. The Meeting noted it would be prudent to create a Risk Evaluation Framework for the CRV against the ICAO DOC 9859 Safety Management that would suit the particular environment for CRV. The reviewed criteria for the consequences by categories to reflect the CRV and risk assessment framework is provided in Appendix B of the Report.

Mandate Firewall – New Zealand (WP/17)

2.17 The paper presented information on the potential to mandate the use of a firewall as part of the CRV implementation. Referring to the APAC CRV Operations manual and the System Design Document (SDD), the Meeting noted the router with an ACL can only provide very limited security and it is recommended that external security advice is sought. Three options for mandating a

firewall were presented for the Meeting consideration. These were Option 1 – *PCCW implemented firewall*, Option 2 – *CRV User implemented firewall*, and Option 3 – *Update INFOSEC Policy*.

2.18 The CRV OG/11 meeting discussed that another option might be that a firewall is provided by PCCWG at one end of connection for State and at another end, State may install their firewall based on States preferences. However, as implementing a firewall and its maintenance may be costly for some States, mandating firewalls for CRV needs more deliberations. The additional proposed option was that CRV OG specifies a set of requirements to meet by States to comply with CRV security policy. However, it required additional contributions from more Member States.

Update the APAC CRV Implementation Table - Sec (WP/10)

2.19 The latest updates presented on the planning and implementation status of CRV were as follows:

- **Under Operation**

Australia, Bhutan, China, Fiji, Hong Kong China, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, PNG, Republic of Korea, Singapore, Thailand, and USA.

- **Under Provisioning**

Nepal, Mongolia, Vietnam

- **Hot Prospects in 2023**

Sri Lanka, Pakistan, and New Caledonia

2.20 The CRV OG/11 meeting reviewed and updated the APAC CRV Implementation Table, which is provided in **Appendix A** of this paper.

ATN Routing and Telecommunication Update – USA (WP/21)

2.21 USA presented the latest Asia/Pacific Regional data telecommunication infrastructure and ATN routing that includes Air Traffic Message Handling System (AMHS) and Aeronautical Fixed Telecommunication Network (AFTN), which is updated and maintained by Aero Thai. The CRV OG/11 meeting was requested to review the information shown in the table, share any plan for new AMHS/AFTN connection, and provide update or modification of the table format to ICAO secretariat during the Meeting or provided by email after the Meeting.

2.22 After reviewing the structure of the table, the Meeting suggested to modify it to accommodate the latest requirements. It was agreed that ACSICG Co-Chair, CRV OG Co-Chairs, and ICAO Secretariat would deliberate and review the structure of the table. The revised structured table will be uploaded on [CRV portal](#) hosted by Airways New Zealand and updated by all APAC Member States. The table will be further reviewed and updated by the ACSICG/10 Meeting.

Upgrade/Downgrade of CRV Circuits Subscribed and Addition of New Sites and Services in the CRV Contract – Sec (WP/04)

2.23 The paper summarized the outcomes of the discussion of the ICAO CRV Steering Group formed in the CRV OG/9 to devise the terms and conditions for the addition of new services, upgrade/downgrade of Packages along with the addition of new sites by the CRV contracted States into their contract.

2.24 The revised proposal for upgrade/downgrade/addition of new sites and services with a reasonable pre-estimate of the anticipated losses suffered by PCCW Global was shared by PCCWG in CRV OG/9 Meeting, which withdrew cancellation charges and five years term for each upgrade case

and addition of new sites/services. The CRV OG/10 Meeting further deliberated, reviewed, and endorsed the proposal to work further on revising relevant documentation of the CRV common Package. In CRV OG Ad-hoc Expert group Meetings, relevant Clauses for upgrade/downgrade/addition of new services or sites were deliberated and finalized. The addendum to Terms and Conditions was presented to the Meeting for adoption. The documents to be updated in CRV Common Packages after the endorsement of relevant clauses by CRV OG/11 were listed.

2.25 The CRV OG/11 meeting **reviewed, modified and endorsed** the Addendum to Terms And Conditions between PCCW Global and CRV Authority **v3**, High-Level Individual Site Questionnaire **v2.2**, PCCWG System Design Document **v4.6**, and Service Order Form (**v2**), which can be accessed on [ICAO CRV Secure portal](#), and [CRV portal](#) hosted by Airways New Zealand.

2.26 The CRV OG Operations Manual v1.2 has been updated to incorporate agreed Addendum to Terms and Conditions between PCCW Global and CRV Authority.

Various CRV users and their joining process – Sec (WP/05)

2.27 To follow up the Action Item 9-9 of the CRV OG/9 and Action Item 6-1 of SWIM TF/6, the paper presented the outcomes of relevant discussion of various CRV OG Expert Ad-hoc group Meetings along with the definition of CRV users prepared by CRV OG Expert Ad-hoc group in concurrence with MET SG experts and their joining process for Meeting approval.

2.28 The reviewed and finalized definition agreed upon by the Meeting was as follows:

CRV USER – State/Administration: An entity officially designated by the State to provide the air traffic or air navigation services the State is obligated to provide according to the ICAO provisions.

CRV USER – Industry: An entity not officially designated by the State but ~~sanctioned~~ **authorised** by the State to provide aviation or related services commercially.

2.29 It was approved that State’s ANSPs will assign IP addresses to any entities joined CRV, and all entities will sign their contract individually. Additionally, for the difference in the joining process, CRV Users- State/Administration **will follow the same process** as mentioned in CRV OG Operational Manual and CRV Landing Page, while industries will **need sponsorship** by States.

2.30 The relevant amendments to CRV OG Operations Manual to include CRV Users definitions and CRV Implementation Plan for IP addressing assignments process for various CRV Users was completed.

Extension of CRV Contract – Sec (WP/06)

2.31 The Meeting noted the APANPIRG **Conclusion APANPIRG/33/7 - Extension of CRV Contract for one year** adopted by the APANPIRG/33 to extend the contract duration for **one additional year**. The ICAO Secretariat has the issued State Letter **Ref.: T 8/2.15 –AP003/23(CNS)** dated **4 January 2023** on the subject: - *Extension of CRV Contract for one year and a reminder for the target year of CRV Implementation by 31 December 2023 in the APAC Region* to inform Member States about the extension of the current contract on same Terms and Conditions and urged to initiate a service order with the PCCW Global for CRV implementation as early as possible, on or **before 31 December 2023** and synchronize the implementation of CRV in the APAC region.

2.32 The CRV OG/11 meeting was invited to modify their contract with PCCWG, as required, and initiate a service order with the PCCW Global for CRV implementation before 31 December 2023, if not joined CRV.

Flexibility in CRV Contract Renewal- New Zealand (Flimsy/01)

2.33 CRV OG Co-Chair (Asia) shared that the term of the contract with the CRV Service Provider (PCCW Global) was set for an initial five years with five additional one-year contract additions totaling a ten-year contractual agreement until 31st December 2027. However, there is an overhead to managing rolling one-year renewals, a different degree of flexibility is required.

2.34 With some States approaching the five-year anniversary of their contracts with PCCWG, questions were being asked about the ability to sign for different periods of time. Therefore, it was proposed that the CRV OG Operations Manual is updated to allow contract extensions of two or three year. The new proposed wordings were:

The terms of the contract with the CRV Service Provider is set for an initial five years with additional One-year, Two year or Three year contract additions until 31st December 2028.

2.35 The Meeting agreed for the proposed clauses to add to CRV OG Operations Manual and CRV OG OM v1.2 was updated accordingly.

Addition of New Package D+ in CRV – Sec (WP/07)

2.36 The paper presented the details of a new Package D+ and proposed to add them in the current CRV common Packages for Meeting review and adoption. The list of documents to be updated in CRV Common Packages after the endorsement of Package D+ definition by CRV OG/11 was shared and the finalized definition and updated CRV common Packages to include the new Package D+ was presented by PCCWG through the WP/08 to the Meeting.

CRV - New Package D+ - PCCW Global (WP/08)

2.37 PCCWG presented the details of new Package D+. The CRV OG/11 meeting noted the CRV common Packages include four major Packages – A, B, C & D and two variations (B+ & C+). To enhance the existing Package D option, Package D+ was defined.

2.38 The CRV OG/11 meeting noted that the service management and SLA of Package D+ connectivity is the same as Package D. In addition, the commercial price for Package D+ is same as Package D. Nonetheless, it needs to add the additional NID price which is available from the current CRV price book in the common Package.

2.39 The CRV OG/11 meeting **reviewed, modified, and adopted** the modified CRV common Package documentation incorporating Package D+. The collective modified CRV common Package document agreed for the upgrade/downgrade/addition of new sites and services and Package D+ is provided on the [ICAO CRV Secure portal](#), and [CRV portal](#) hosted by Airways New Zealand.

CRV Network Yearly Service Review 2022 - PCCWG (SP/01)

2.40 PCCWG shared Latest CRV Updates and CRV Network Yearly Service Review for 2022. The Meeting was informed about the 2022 Ticket Summary by Ticket Type and their overview. PCCWG informed that there are 65 circuits in 34 cities with different CRV Packages, A, B+, C+, C and D. There are 2 service providers in the CRV network and 4 circuits (B+ and D) are under implementation. It was further informed that 3 cities are joining CRV in 2023, which are French Polynesia / New Caledonia, Sri Lanka – Colombo, and Pakistan- Karachi.

CRV Post Implementation Issues in Bhutan – Sec (WP/11)

2.41 The paper updated the progress of the issues faced by Bhutan related to CRV post implementation in 2021 due to the non-readiness of peer States and the actions taken by CRV OG and ACSICG for its resolution.

2.42 The CRV OG/11 meeting noted that Bhutan informed the ICAO APAC Office through email on 6 July, 2022 that considering the connectivity between Bhutan and Thailand is currently under inspection process for reliability/stability test and after consensus with New Zealand, Bhutan has decided to discontinue the temporary CRV connectivity with New Zealand.

2.43 Thailand confirmed that the CRV connectivity with Bhutan had been implemented. Therefore, the ad-hoc group formed to resolve this issue was **dissolved**. The CRV OG/11 meeting shared its appreciation to the work done by the Ad-hoc group and participating States' tremendous support in resolving the issue. The relevant action items resulting from past CRV OG and ACSICG Meetings were marked as closed.

PASNet for the Pacific Islands CRV connectivity – New Zealand (WP/23)

2.44 The paper presented an overview of the options for using PASNet to connect the Pacific Islands to CRV. Considering the options for network connectivity to some Pacific Islands are limited and in some cases expensive, the World Bank implemented the **Pacific Aviation Safety Network (PASNet)** in 20xx. Till today, 4 cycles of installation have occurred in the Pacific. The Sites currently supported are Tonga (one site is Airways New Zealand owned, the other is Tonga owned, Samoa, Cook Islands, Niue, Tarawa, Solomon Islands, and Funafuti. Soon to be installed are 3 sites in Vanuatu.

2.45 The PASNet was built in a similar way to the CRV, focusing on immediate needs. The options for connecting CRV to PASNet have been narrowed to two options: *installing a new CRV NID in Christchurch* and *using the exiting Airways New Zealand Christchurch CRV NID*. The CRV OG/11 meeting deliberated both options' operating model, cost recovery, monitoring, etc. The Meeting noted that in each option there will be design changes required to the current installation to support the allocated IP address for the Pacific Island State, routing to the peering State and specific services expected to be used. Additionally, it was informed that the cost to implement connectivity of CRV over PASNet is still unknown. There is a strategy discussion on this in February 2023 within Airways New Zealand.

2.46 The CRV OG/11 meeting discussed the significance of PASNet project, its potential benefits after implementation and noted the progress of the project. Further updates on the project will be shared by New Zealand in CRV OG Meetings.

Progress of CRV Implementation in Malaysia (IP/03)

2.47 Malaysia presented the CRV implementation status between Malaysia and Singapore, Thailand, India, and Indonesia. Malaysia informed that it subscribes to Package A with 2Mbps, which connects Kuala Lumpur Air Traffic Control Center (KLATCC) to the CRV network. In the near future, Malaysia may consider adding CRV subscriptions that connect for Kota Kinabalu Air Traffic Control Center (KK ATCC) to the neighboring States with Packages according to operational needs.

Current Status of CRV Implementation in Indonesia (IP/04)

2.48 The paper provided information on the latest progress of CRV implementation in Indonesia. The CRV OG/11 meeting noted Indonesia has signed the service contract of CRV project with PCCW Global on March 17, 2022, which subscribed to the CRV Connection Package C. The Meeting was informed that Indonesia prepared the CRV connection to replace the existing point-to-point connection for Voice and Data. The CRV Implementation timeline in Indonesia was shared in detail.

2.49 Nepal questioned if a bilateral agreement is required for joining CRV. It was informed that no bilateral agreement is required to join CRV. However, as a part of CRV joining process, it is recommended that States should do bilateral coordination with peers States to agree on CRV utilization. The CRV OG OM v1.2 stated it as a recommended practice.

AMHS Upgrade and CRV Implementation Status - Republic of Korea (ROK) (IP/05)

2.50 The paper presented the progress of AMHS upgrade, the status and the plan of CRV implementation in the Republic of Korea. The CRV OG/11 meeting noted the CRV changes between Korea and China in November 2022 and between Korea and Japan in December 2022 were successfully completed. In addition, the progress of CRV conversion of air control voice communication network from 2020 and aeronautical data usage between countries in the Republic of Korea were introduced. The Republic of Korea is preparing for the next-generation weather information IWXXM data transmission test between countries and promoting the establishment of CRV based SWIM.

2.51 A query was raised about the need of subscription to two CRV Packages by ROK. ROK responded that two Packages had been subscribed for voice and data communication separately.

Voice Circuit Migrated over CRV – Japan (IP/06)

2.52 The paper presented the experience of Voice circuit for ATC migration to CRV by 2022 in Japan. Japan introduced the policies set for voice circuit migration to CRV, updated the progress of voice circuit migration to CRV with FAA, Taipei ACC, Incheon and Daegu ACC, and Manila ACC through relevant diagrams, and shared the further plan for migration with Incheon/Daegu ACC, FAA, Moscow and Khabarovsk ACC, and Shanghai ACC.

Current Status of CRV Implementation in India (IP/07)

2.53 The paper provided information on the latest progress of CRV implementation in India. The CRV OG/11 meeting noted that the Purchase Order for CRV implementation in India was awarded to M/s PCCWG on March 15, 2022. The GRE tunnels has been setup between Mumbai–Bangkok, Mumbai-Kathmandu, Mumbai- Singapore, Mumbai–Beijing and Mumbai-Paro. AMHS trial between Mumbai-Bangkok over CRV has been carried out successfully while AMHS trial between Mumbai-Singapore, Mumbai-Kathmandu, and Mumbai-Paro over CRV are presently in progress. Concerned States are encouraged to interface their CRV Network with India for further testing and validation.

Update on Fiji's CRV Network Upgrade (IP/08)

2.54 Fiji presented an update on the implementation of the CRV Package B+ for voice and AMHS services in Fiji. The CRV OG/11 meeting noted that Fiji has completed the upgrade of its CRV Package C+ to Package B+ in September 2021 for the AMHS & Voice service between Nadi, Auckland, and Brisbane & Oakland/Salt Lake center. Currently, the failover is conducted manually between CRV NID 1 & 2 and it is planned to implement the automatic failover in Q2 of 2023. The diagram depicting the high level drawing of the CRV Package B+ implemented with a CRV POP in Sydney that connects to CRV NID1 using a dedicated IP connection and the CRV POP in Hong Kong connected to CRV NID2 using the internet connection was described.

MPLS/IP Based Inter-Regional Connection – Sec (WP/12)

2.55 The paper provided the current status of discussion being done for potential interconnection of CRV and REDDIG II and CRV and New PENS and requested APAC Member States to record their interest, willingness, or need for interconnection of the CRV with other regional networks such as REDDIG II / New PENS with the ICAO secretariat.

2.56 As per the latest updates from ICAO SAM Office, Lumen LATAM (Latin America)

has been sold to Cirion Technologies. PCCW Global is a client of Cirion Technologies in Chile, which allows to building of an interconnection solution using the Santiago facilities. The ICAO SAM Secretariat requested Cirion Technologies to discuss the proposal with PCCW Global personnel and formally presented it in the next Meeting. Therefore, at present, there is no concert technical proposal ready to work further for CRV and REDDIG II interconnection. Furthermore, the Meeting noted that the interconnection proposal for CRV and New PENS is in progress.

Inter-regional connection between Russian and APAC AMHS Centers – Russia (WP/18)

2.57 Russia informed that in the Russian Federation, the COM centers of Moscow and Khabarovsk performed the function of Interregional AFS Gateways between ICAO EUR/NAT and APAC regions providing aeronautical information exchange not only for Russia but also for European countries. The message exchange between Russia and ICAO APAC region via the interregional gateway is performed using AFTN protocol, which prevents the use of advanced methods of aeronautical information exchange such as IWXXM, AIXM, FIXM and others.

2.58 Considering the restrictions on the use of Cisco equipment at Moscow and Khabarovsk COM centers, the Russian Federation proposed to study the following solutions for connecting Moscow and Khabarovsk COM centers to CRV to ensure the transition to AMHS technology with COM centers of the APAC region (Japan and China)

- Possibility for CRV provider to use equipment from other (not Cisco) manufacturers as CE routers in the COM centers of Moscow and Khabarovsk.
- Implementation of dedicated L2 VPN links between Moscow and Khabarovsk COM centers and corresponding COM centers of the APAC region (Japan and China);
- Implementation of interregional connection between the CRV and aeronautical virtual IP network of the Russian Federation based on MPLS Network-to-Network Interface (NNI) (CRV OG/9 - WP/12).

2.59 With due consideration to the time needed to study the available solutions, Russia proposed to implement an interim connection between COM centers via a dedicated L2 VPN link to expedite transition to AMHS. The current status of transition to AMHS with Japan and China was shared.

2.60 In addition, the Russian Federation also shared its support for the initiative to explore potential MPLS/IP based inter-regional connection between CRV and REDDIG II networks. The establishment of such connection will eventually provide for the transition to AMHS via the CRV and ensure exchange of other types of information as one of the prerequisites for system-wide information management (SWIM) implementation.

2.61 Japan informed that as it had already implemented CRV, instead of establishing an additional L2 VPN link, Japan would prefer to wait for Russia to join CRV. Russia shared its willingness to discuss with Japan other proposals for interconnection individually.

Update on Using the Rest of CRV MSA - Sec (WP/13)

2.62 The paper presented an update on the recent development of using the balance fund of the MSA. The Meeting noted that to get the formal consent from the Pioneer States/Administration to utilize the remaining fund for the CRV, the APANPIRG/33 endorsed the **Conclusion APANPIRG/33/6 - Revised Amendment of the Management Service Agreement for CRV project (RAS14801)** and agreed that the remaining fund would be utilized in 5 years starting from the actual date of adoption of

the revised document by APANPIRG.

2.63 As such, ICAO Secretariat issued State Letter **Ref.: T 8/2.15 –AP-CNS 00xx/23** dated 9 January 2023 and Ref.: T 8/2.15 – AP-CNS 0026/23 dated 17 January, 2023 on the subject: - *Revised Amendment of the Management Service Agreement for the CRV project (RAS14801)* to Countersign the Revised amended Project Document or inform the intention to receive the share of the remaining fund balance to 16 pioneer States. Additional clarifications were issued on 17 January 2023.

2.64 In response, **15** Member States countersigned or shared confirmation to countersign the Revised amended Project Document to provide consent to utilize the remaining fund for the CRV, No responses were received from **1** Member State.

2.65 It was proposed that after finalizing of Terms of Reference for the approved task and estimated cost, if the remaining amount of is too low to utilize for agreed tasks, CRV OG may deliberate and decide on additional cost-sharing arrangements. Additionally, if it is agreed that the remaining amount is too low for approved work and there is no consensus for the remaining cost-sharing arrangement, it is proposed to refund the remaining share to all 16 pioneer States/Administrations.

Using the rest of money: ToR of Safety Assessment – New Zealand (WP/14)

2.66 New Zealand presented Safety Assessment options for the CRV using the remaining Pioneer State money. Discussion at CRV OG Meeting has suggested that the remaining funds from the CRV Project could be used to facilitate a Safety Assessment of the CRV network. It was assumed that the Safety Assessment means a Cyber Security Review. The **6 possible Security Review** options could be considered by the Meeting were as follows:

- Option 1 - Desktop review of the PCCWG implementation only
- Option 2 - Penetration test of the PCCWG implementation only
- Option 3 - Desktop review of the end-to-end implementation including States connectivity
- Option 4 - Penetration test of the end-to-end implementation including States connectivity
- Option 5 - Engage a Security consultant to review the Common Package, RFP documentation including the response, Implementation Plan and the Operations Manual and provide a Security recommendation based on this review.
- Option 6 – Request PCCWG to carry out either a one off, annual or biennial Security Reviews and disclose the recommendations to be discussed by the CRV OG.

2.67 It was anticipated that this will use all of the remaining funds from the project. Consideration from the CRV should be given to the possibility of needing to contribute further funds depending on the Terms of Reference (ToR) and subsequent quote. The Meeting deliberated for various proposed options and **agreed to adopt Option 2 and 5**.

2.68 With the aforementioned, the **Draft Conclusion CRV OG/11/03 – Selection of Security Review Options 2 and 5 and Develop a ToR** was endorsed by the CRV OG/11 meeting for ACSICG/10 consideration and CNS SG/27 adoption.

2.69 As a way forward, it was agreed that a draft ToR will be prepared by CRV OG Ad-hoc Expert Group and submitted to the ACSICG/10 Meeting for review and approval. After the ACSICG/10 Meeting approves ToR, quotations will be requested from various cyber security expert agencies and appraised cost with a tentative plan and timelines for its accomplishment will be presented to the CRV OG/12 Meeting for agreement on the scope of work and the final decision for utilization of fund for agreed ToR. After the approval of CRV OG/12, an agency will be selected, and the chosen agency will execute the task.

(New) PENS and the EATM CERT Cybersecurity Considerations – EUROCONTROL (SP/02)

2.70 The presentation generically introduced the security management practices from the PENS Community perspective and the activities of the European Air Traffic Management Computer Emergency Response Team (EATM CERT) with a focus on penetration testing (ethical testing). The CRV OG/11 meeting was informed that the Cybersecurity Assessment conducted by EUROCONTROL/NM in 2018 highlighted that the New PENS Contract/Service incorporates all industry good practices on security requirements. PENS Community approaches to User Security and Cyber Security were shared. With the introduction of the risk levels definition, the results of penetration testing on aviation systems were explained.

2.71 A query was raised about the reaction of the New PENS service provider and other States to conducting a penetration test. Eurocontrol informed that the penetration testing was volunteered by States, and the New PENS service provider was obliged to allow penetration testing as per the contract.

(New) PENS IPv6 Addressing Considerations- EUROCONTROL (SP/03)

2.72 The presentation shared that PENS is IPv6 enabled (dual IPv4/IPv6 stack available) and each individual PENS User is assigned upon request 4x /48 IPv6 public ranges by EUROCONTROL. Ranges assigned to any given PENS Users are public, specific to the user hence unique on a global scales. Ranges assigned to the PENS Users are therefore decoupled from that of the PENS Service Provider avoiding the need for IP address change/renumbering when changing service provider. Furthermore, the IPv6 address space allocation which is performed through the “Network Addresses Management Services (NAMS)” were introduced.

2.73 The CRV OG/11 meeting noted that IPv6 is used for ATFM and AMHS is still using IPv4. A query was raised about the action taken by ICAO for IPv6 regional block allocation. ICAO Secretariat informed that as of today, there is no requirement from the Trust Framework Panel to use a dedicated block of IPv6 addresses or a fully qualified DNS. Analysis and studies are ongoing but there is still no decision.

Review ToR and Action Items - Sec (WP/15)

2.74 The CRV OG/11 meeting reviewed the ToR of CRV OG and further updated the Action Items for CRV OG, which is provided in Appendix D of the Report.

Date and Venue for the Next Meeting

2.75 The CRV OG/11 meeting agreed to organize the next CRV OG Meeting as an **In Person Meeting** to further progress tasks listed in the Terms of Reference, with a tentative date from **24-26 January 2024**. The Secretariat will coordinate for hosting the next Meeting in Members States of the group or will organise it in ICAO APAC Office Bangkok and inform participants in due course of the exact dates and venue.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information in this paper; and
- b) discuss any matters as appropriate.

UPDATED APAC CRV IMPLEMENTATION TABLE

SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
1	Afghanistan					
2	Australia*	Fiji New Zealand USA PNG Singapore	Contract in May2018 and service readiness in 3Q 2018	AFTN, ADS-B, AMHS, Voice With: <u>Completed:</u> Fiji March,2019 (AMHS June 2019/AIDC, Voice completed April) New Zealand , February, 2019 (AMHS June 2019, AFTN May 2019/AIDC), March, 2019 (Voice April 2019 completed) Singapore Dec, 2020 (AMHS/AIDC); PNG June 2021 (AFTN) Oct 2021 (Voice) USA March 2019 (AFTN) March 2019 (Voice) <u>Pending:</u> South Africa TBC (AMHS/AIDC, Voice);	Staged approach	Termination of current COM contract

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
				Indonesia TBC 2022 (AMHS/AIDC, Voice, ADS-B);		
3	Bangladesh					
4	Bhutan	Thailand (Bangkok)	Contract signed on Oct 2019. CRV installed successfully in Dec 2021. CRV P2P Test between Paro- Bangkok completed. CRV P2P Test between Paro- Mumbai completed on Jan 2023 CRV cutover between Paro-Mumbai is scheduled on March 2023	AMHS first. Voice and ADS-B – to be decided.	Staged Approach	Dependent on India for full utilization of CRV network.

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
5	Brunei Darussalam					
6	Cambodia		As early as convenient, dependent on neighbouring countries			Internal decision making
7	China*	Hong Kong China Japan Republic of Korea	Contract signed on 21 June 2020.	Applications targeted: Data(AMHS) With: Hong Kong 3Q2020; Japan 4Q2020; Thailand TBD; India 2022. Republic of Korea 4Q2022 Mongolia 4Q2022 ATFM test with Japan and ROK at Sep 2020 over CRV ADP exchange with Mongolia 4Q2022	Staged approach	

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
8	Hong Kong, China*	Philippines China Japan Thailand Vietnam	Contract signed on 6 April 2018. Connection was installed successfully in June 2018.	With Manila CRV-Voice put into operation in August 2018 CRV-AMHS put into operation in May 2019 With Fukuoka CRV-AMHS put into operation in September 2020 With Beijing CRV - AMHS POT in March and operation in April 2021 With Bangkok CRV-AMHS put into operation in August 2022	Staged approach	Need to coordinate with relevant CAAs/ANSPs in joining CRV in a harmonized manner, etc.
9	Macau China		December 2022	To be confirmed	Staged approach	Migration from X.25 to IPS
10	Cook Islands					
11	Democratic People's Republic of Korea		Contract in 3Q2018 and service readiness in 4Q2018	AFTN and VoIP		

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
12	Fiji*	Australia New Zealand USA	Contract in May 2018 and service readiness in 3Q 2018.	Data (AMHS) and VoIP With: Australia ATS voice April 2019 completed, AMHS completed in July 2019, NZ ATS voice completed April 2019 and USA ATS voice completed in March 2019 and AMHS completed in April 2019.	Staged approach	CBA, safety case
13	France: -New Caledonia -French Polynesia	Fiji New-Zealand	Q3/2023 Q3/2023	ATS Voice, AMHS AFTN/AMHS with NZ.	Staged approach	Depends on an agreement with peer States on adding a layer of encryption (PSK) over CRV

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
14	India*	<p>The GRE tunnels has been setup between:</p> <p>Mumbai–Bangkok, Mumbai- Singapore, Mumbai–Beijing and Mumbai-Paro.</p> <p>Mumbai- Kathmandu GRE Tunnel under tests</p> <p>Note: AMHS trails between Mumbai- Bangkok over CRV has been carried out successfully. AMHS trails between Mumbai- Singapore, Mumbai - Bhutan over CRV are presently in progress.</p>	<p>Contract for CRV implementation with M/s PCCW in India Signed on 15th March, 2022. CRV Circuit has been delivered in Dec, 2022.</p> <p>CRV Cutover: End of 1Q2023</p>	AFTN/AMHS, , ATS Voice & ADS-B	Staged approach	<p>Note: On successful trial Operation with BBIS/BIS States, the CRV Cutover will be planned.</p>

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
15	Indonesia		Contract in 1Q2022 and service readiness in 2023.	Australia 2023 (voice & data) Malaysia 2023 (voice) Papua New Guinea 2023 (voice) Philippine 2023 (voice) Singapore 2023(voice & data) USA 2023(voice)		
16	Japan*	Hong Kong China USA Singapore China RoK Philippine	Contract signed in Nov.2017 and service readiness in 1Q 2018 for Fukuoka	USA AMHS(1Q 2019) Voice(2Q 2021) Hong Kong, China AMHS(3Q 2020) Singapore AMHS(4Q 2020) China AMHS(1Q 2021) ATFM(1Q 2021) Taipei ACC Voice(1Q 2022) AIDC(planned 1Q 2023) R.O.K AMHS(4Q 2022) Voice(1Q 2021) and additional line plan in progress AIDC(planned 1Q 2024) Philippine Voice(2Q 2022)	In progress	
17	Kiribati					

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
18	Lao PDR					
19	Malaysia	Thailand Singapore Indonesia India	Contract signed between CAAM and PCCWG in Sept 2022. CRV service readiness started in Nov 2021.	<p>Thailand</p> <ul style="list-style-type: none"> 1) Network connectivity testing (AMHS/AIDC) – Oct 2022 2) Completed cut over & migration (AMHS /AIDC) – Jan 2023 3) Voice & ADS-B (testing, migration-TBD) <p>Singapore</p> <ul style="list-style-type: none"> 1) Network connectivity testing (AMHS/AIDC) – May 2022 2) Estimate cut over & migration (AMHS/AIDC) – Q1/2023 3) Voice & ADS-B (testing, migration-TBD) <p>India</p> <ul style="list-style-type: none"> 1) Estimate network connectivity testing (AMHS/AIDC) – Q1/ 2023 2) Estimate cut over & migration (AMHS/AIDC) – Q1/2023 3) Voice & ADS-B (testing, migration-TBD) <p>Indonesia</p>	Staged approach	

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
				1) Estimate network connectivity testing (AMHS/AIDC) – Q2/2023 2) Estimate cut over & migration (AMHS/AIDC) – Q2/2023 3) Voice & ADS-B (testing, migration-TBD		
20	Maldives					
21	Marshall Islands					
22	Micronesia (Federated States of)					
23	Mongolia	CAAM and PCCWG made ICMP package test in 2021.	Contract in 1Q2022 and service readiness in 4Q2022	AFTN, ADS-B, AMHS, Voice With: China Dec, 2022(AMHS), (ADP) TBD Voice, ADS-B, AFTN Russia TBD (AFTN, ADS-B, AMHS, Voice)	staged approach	Negotiations with neighbouring countries and stakeholders on CRVs and its use are critical to implementation.

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
24	Myanmar	China , India, Thailand, Laos, Bangladesh.	Contract will be signed after discussed with PCCW Global. Implementation was targeted in Q4/2023 depends on PCCW's proposal quotation. Already sent to high level questionnaire form V 2.1 in June 2021 and V 2.2 again to PCCWG in Feb 2023 to join the CRV implementation.	AFTN/AMHS, AIDC, ADS-B and Voice	Staged approach	Need to coordinate with relevant CAAs/ANSPs in joining CRV network to be harmonized regionally.
25	Nauru					
26	Nepal		SO signed with PCCW	AFTN/AMHS	Staged Approach	BBIS-state India joining the CRV network, as most traffic is routed through it

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
27	New Zealand	Australia USA Fiji French Polynesia Chile	Contract signed in July 2018 and service implemented December 2018	Australia Voice Completed March 2019 and AMHS June 2019 Completed USA Voice Completed March 2019 and AMHS March 2019 Completed Fiji Voice Completed April 2019 French Polynesia AMHS and Voice Chile AMHS (SAM regional network REDDIG)	Awaiting French Polynesia joining. Awaiting outcome of inter-regional network connectivity discussion. For Chile	CBA attractive if all counterparts join in.
28	Pakistan	China India	Duly Signed Service Order Form Submitted on 23 rd Jan 2023 for Finalization / Execution of the Contract. As per timeline given by PCCW Global the CRV will be implemented by August / Sept 2023	AMHS /AFTN / VOICE	In progress	Package-D is opted to establish link between China and India. Connectivity with other neighbouring regions / FIRs i.e. Tehran, Kuwait, Kabul & Muscat could be migrated on CRV only if the states join CRV.
29	Palau					

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
30	Papua New Guinea	Australia USA-Oakland USA-Aireon		Australia: AFTN June 2021, Voice Oct 2021 USA-Oakland Voice November 2021 USA-Aireon Space based ADSB-July 2021	Staged approach	Completed
31	Philippines	Hong Kong China Singapore USA Japan	Contract signed in March 2018 and service readiness in 2Q2018	Completed: With HONG KONG AIDC - 2Q2019; AMHS - 2Q2019; Voice - 3Q2018. With SINGAPORE AIDC – 4Q2019; AMHS – 4Q2020; Voice – 1Q2020. With USA AMHS – 2Q2021; Voice – 4Q2019. With JAPAN Voice – 1Q2022. Operational Trial:	staged approach	Success transition to the New ATM center in 4Q2018 Dependencies: AIDC with Kota Kinabalu implemented via BBIS Singapore AIDC with Ujung Pandang implemented via BBIS Singapore

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
				<p>With USA AIDC – 4Q2022 Planned: With INDONESIA Ujung Pandang Voice – 1Q2023</p>		
32	Republic of Korea	Japan China	Contract in 3Q 2019 and service readiness in 4Q 2022	<p>Completed: with Japan Voice –March 2021 Data(AMHS) - December 2022</p> <p>With China Data(AMHS) – November 2022</p> <p>Planned; With Japan Voice additional lines-from 2022 to 2023</p>	staged approach	Data(AMHS) POT in 4Q and operation from 4Q 2022
33	Samoa					

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
34	Singapore*	Australia Japan Philippines Thailand	Contract signed in May 2019 and service readiness in Dec 2019	Data (AMHS over IP) with: Australia Dec 2020 (completed); Japan Nov 2020 (completed); Philippines Dec 2020 (completed); Thailand Sep 2022 (completed); India Q1 2023 (in progress, testing completed); and Malaysia Q1 2023 (in progress, testing completed). Voice with: Philippines Mar 2020 (completed).	Staged approach	
35	Solomon Islands					
36	Sri Lanka	Planned: Australia India Indonesia Maldives Singapore	Nov-Dec 2022	Q1 2023 - AMHS with Singapore TBD - AMHS connectivity with Mumbai, and Male. TBD - Direct Speech facilities with Chennai, Trivandrum, Mumbai, Male, Jakarta, Melbourne, Singapore.	Phased Approach	Package D is planned based on CBA conducted. Comparison of performance of Package D and existing IPLC circuit.

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
37	Thailand		1. Contract in 3Q2021 Status: Completed 2. Service readiness in 2Q2022 Status: Completed	Data first Then voice, subject to safety case: <u>Bhutan 3Q2022 (Completed)</u> ; <u>Hong Kong 3Q2022 (Completed)</u> ; <u>Singapore 3Q2022 (Completed)</u> ; <u>Malaysia 1Q2023(Completed)</u> ; India <u>1Q2023</u> ; Beijing <u>2Q2023</u>	Staged approach	
38	Timor Leste					
39	Tonga					
40	Tuvalu					

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
41	United States*	Australia Fiji Japan Philippines New Zealand Papua New Guinea Tahiti Russia	Contract in January 2018	1) AMHS with Australia Fiji Japan Philippines New Zealand Papua New Guinea (2021) Indonesia (2022) 2) AIDC with Fiji Japan New Zealand Papua New Guinea (Direct planned 2021) Tahiti (via New Zealand) Indonesia (Direct planned 2022) Russia (when join CRV) 3) VoIP with Fiji Japan Philippines New Zealand Papua New Guinea (direct planned 2021) Indonesia (2022)	Staged approach	

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SN	State/ Administration (with* is BBIS; marked in blue- not yet join CRV/ no updates)	States /Administrations connected	Intended date for CRV cut- over	Applications targeted	Migration scheme	Prerequisites/ dependencies
42	Vanuatu					
43	Vietnam	Hong Kong, China Singapore Philippines	Contract signed in M 4Q/2022, Service readiness in May -2023	AFTN/AMHS connectivity with Hong Kong Voice and AFTN/AMHS with Singapore Voice and AFTN/AMHS with Philippines	staged approach	
