Common AeRonautical Virtual (CRV) Network and PASNET

Frederic Lecat

Regional Officer Communications Navigation Surveillance,
ICAO Asia/Pacific Regional Office (Bangkok) (by Skype)

ICAO Workshop for Pacific Island States,

12-15 December 2016

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WHAT IS CRV?

What is CRV?

- An Asia-Pacific aeronautical network for Asia-Pacific and Middle East ICAO Members: CRV, the "Common AeRonautical Virtual (CRV) Network "

- A wholly dependable and reliable communications infrastructure for aeronautical communications, enabling the global roadmap (ASBU B0-FICE, B0-NOPS, VoIP and B1-SWIM modules)

Services carried by CRV

- "The objective of the CRV is to offer a safe, secure, robust and cost effective telecommunications transport service to all Members"
- AFTN
- AMHS
- voice ATM communications
- AIDC data
- ATFM
- AIM data
- SWIM
- Air-ground Data Link communications (in case we have one day ATN routers in common)
- ATS surveillance
- Miscellaneous data: other data not pertaining to the categories above, or carried for TEST purpose only
- Any other category as agreed later

WHY CRV?

ANC/12 Recommendation

Recommendation 1/6 – Data communications issues

That ICAO:

a)   organize a multidisciplinary review of air traffic control **communication requirements and issues**; and

b)   review the **operation, management and modernization of a regional digital network technical cooperation project and other similar regional experiences with the aim that this efficient practice can be adapted for use in other ICAO regions**;

That States:

c)   explore multi-modal solutions when appropriate to **overcome transition issues**; and

d)   anticipate and accelerate the migration of **air traffic management communication systems towards more efficient technologies** to timely service the aviation system block upgrade modules.
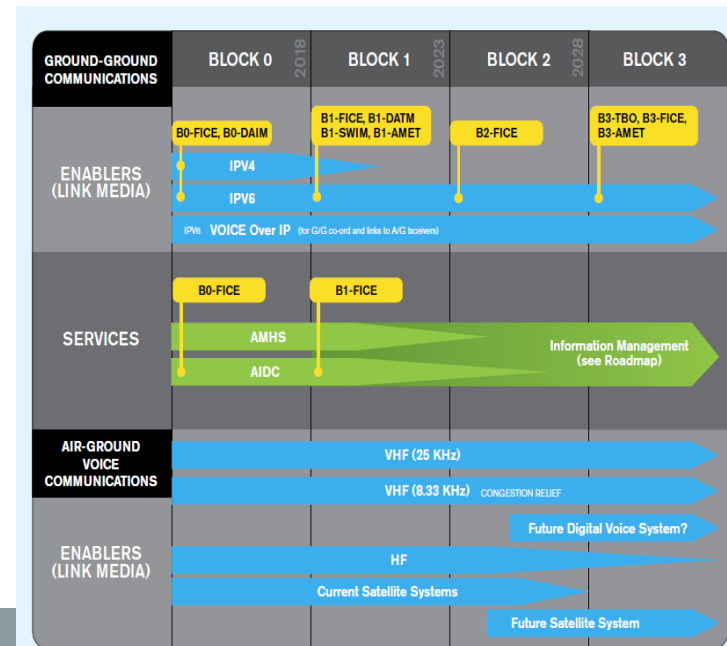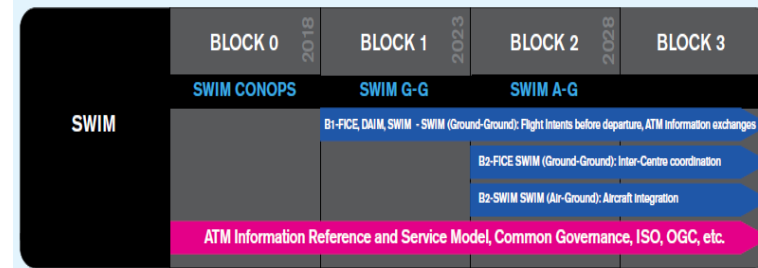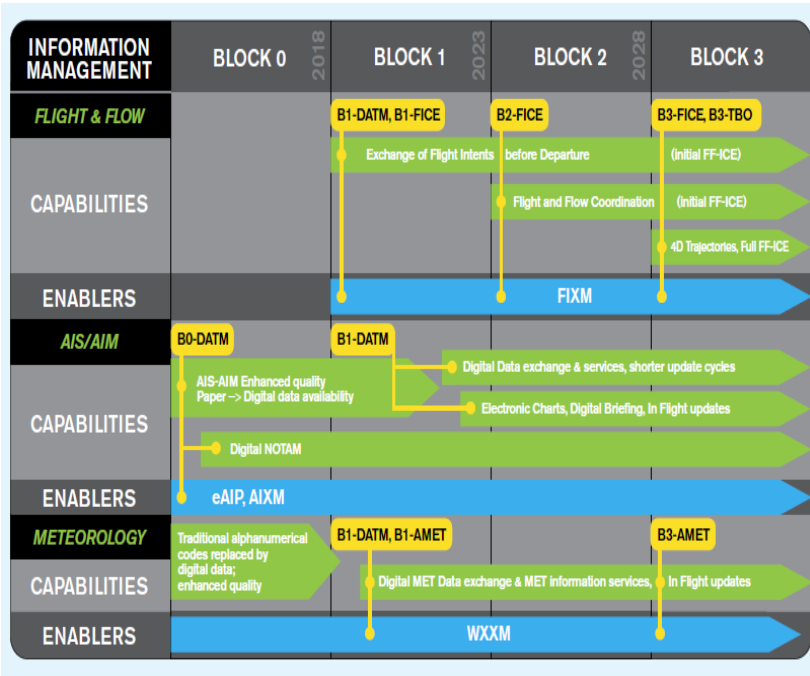
ATM Operational Concept

- Doc 9854 Global Air Traffic Management Operational Concept
- ***Media***
- 2.9.16 Information will use a variety of channels on the ground (and space-based segments). The best information routing will be selected for use on the basis of quality of service and economic criteria, possibly in real time.

GANP

Issues addressed

- Reduce telecommunication costs in most cases (to be confirmed by local CBA)
- Enable integration in the aeronautical infrastructure and enhanced services (GANP, regional objectives)
- Enhance information security
- Provide a standardized interface for AFS (instead of multiple protocols, some of which are obsolescent)
- Rationalize coordination for network management and enhancement
- Respond to Air Traffic requirements in a timely and standardized manner

Elsewhere

- European region has implemented the Pan-European Network Service (PENS)
- North American region has FAA Telecommunication Infrastructure (FTI) to support Canada and USA to distribute AFS data
- South America has REDDIG
- Caribbean has MEVA
- …

Regional provisions

- Regional Air Navigation Plan volume II
  - 2.16   In the case of integrated communications services procured and shared by several States, organizational provisions should allow for the planning and performing of the management of technical performance, network configuration, fault, security, cost division/allocation, contract, orders and payment.
- Seamless ATM plan v2, Phase 2 (expected implementation by 07 November 2019):
  - 7.29   All ANSPs serving high density FIR should connect to CRV (Common aeRonautical Virtual private network).

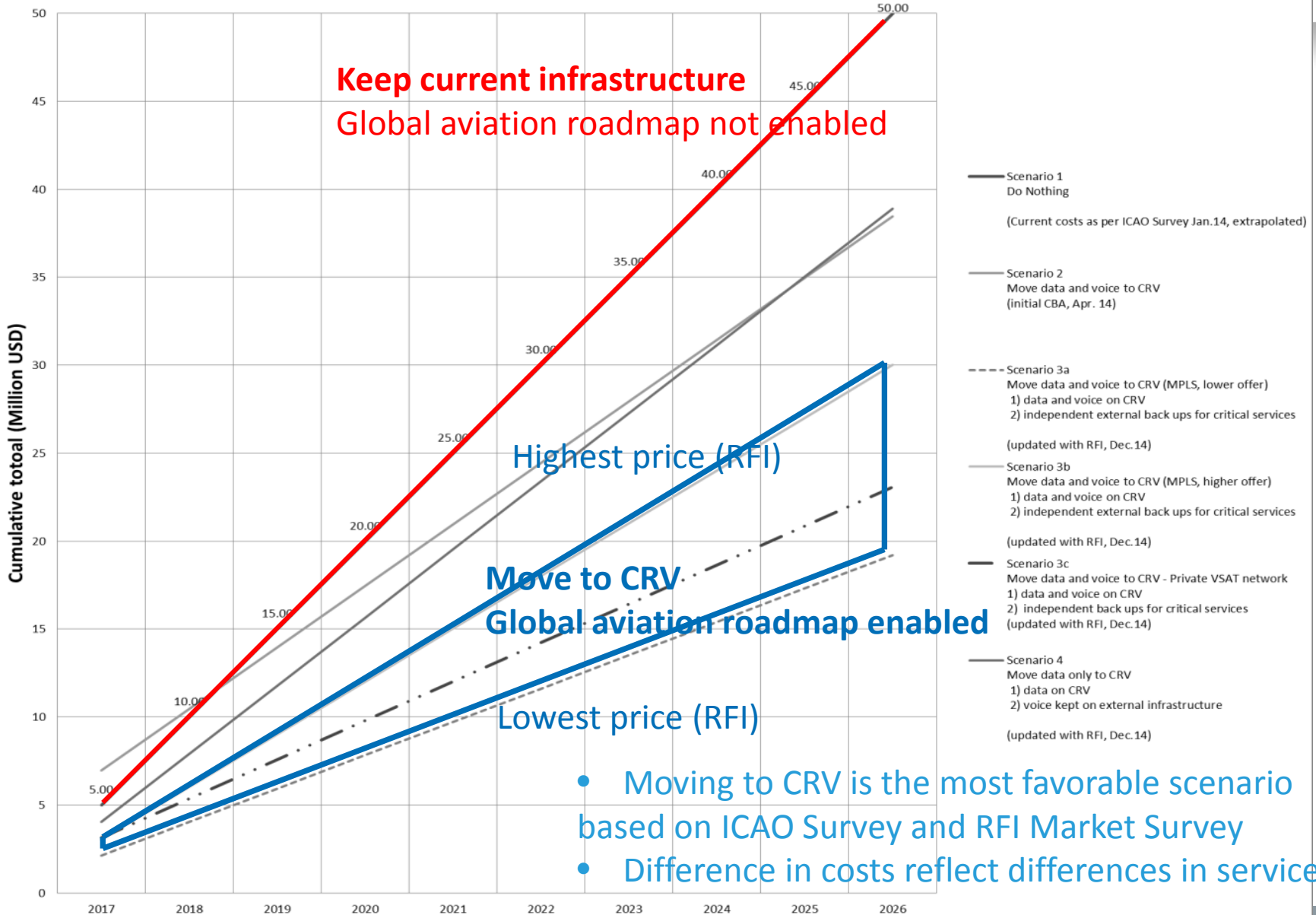# RESULTS OF COST BENEFIT ANALYSIS, BASED ON THE REQUEST FOR INFORMATION (RFI) AS OF JAN.15

Cost benefit analysis

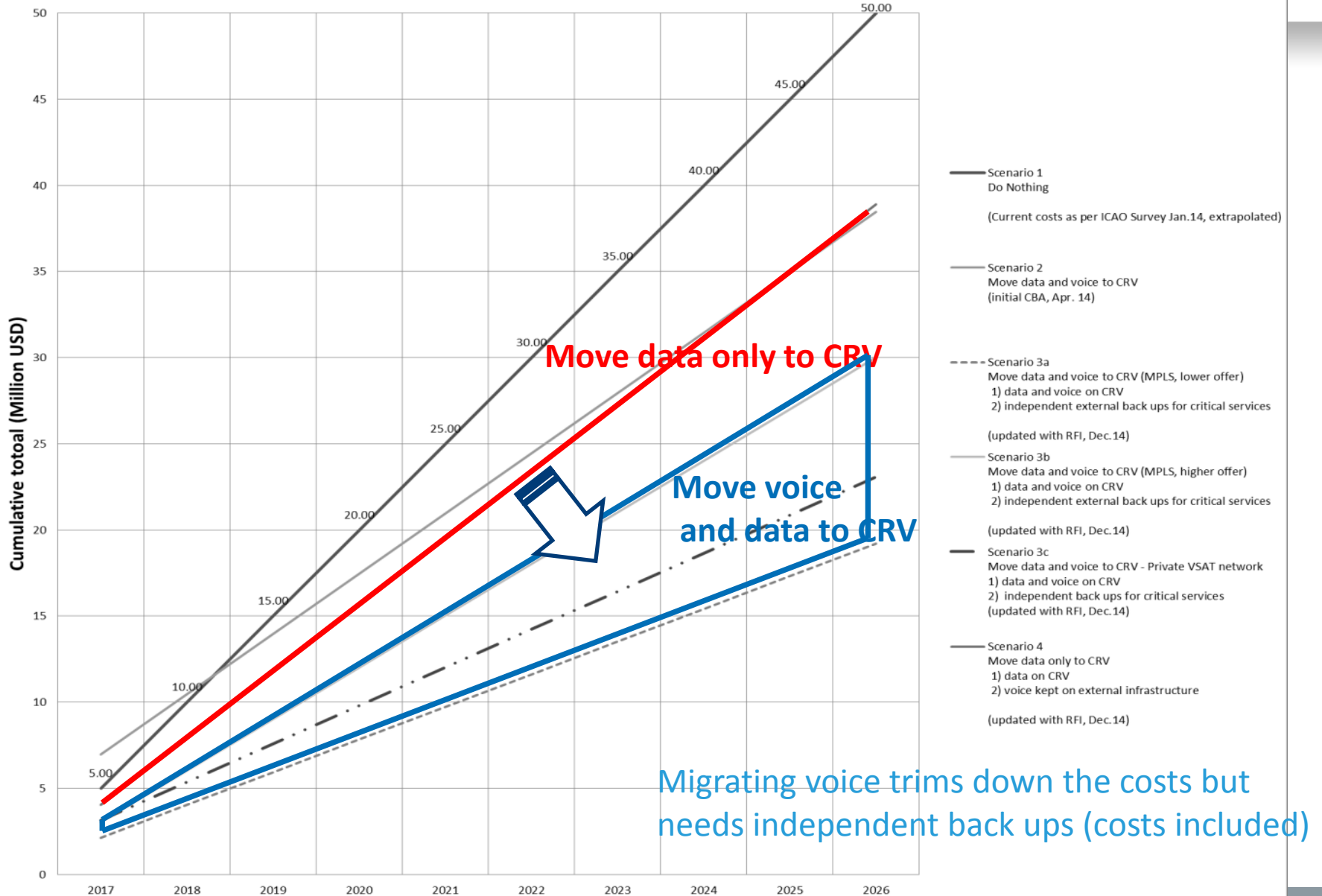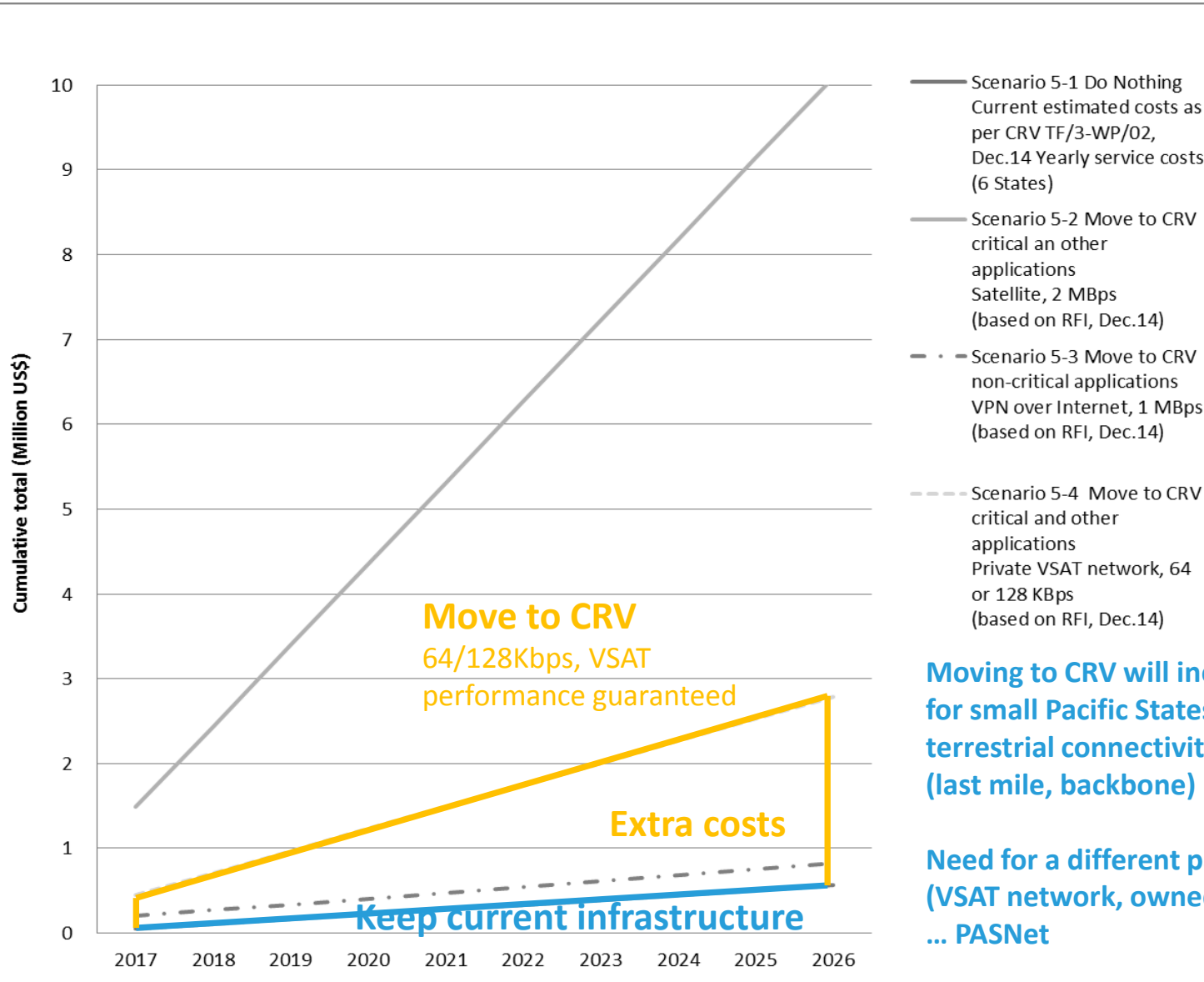| ICAO Survey 2013-2014 | CBA First iteration – Apr. 2014 | CBA Second iteration - after RFI – May 2015 | Local CBA – In progress |

Keep current infrastructure
Global aviation roadmap not enabled

Highest price (RFI)

Move to CRV
Global aviation roadmap enabled

Lowest price (RFI)

Scenario 1
Do Nothing

(Current costs as per ICAO Survey Jan.14, extrapolated)

Scenario 2
Move data and voice to CRV
(initial CBA, Apr. 14)

Scenario 3a
Move data and voice to CRV (MPLS, lower offer)
1) data and voice on CRV
2) independent external back ups for critical services

(updated with RFI, Dec.14)

Scenario 3b
Move data and voice to CRV (MPLS, higher offer)
1) data and voice on CRV
2) independent external back ups for critical services

(updated with RFI, Dec.14)

Scenario 3c
Move data and voice to CRV - Private VSAT network
1) data and voice on CRV
2) independent back ups for critical services
(updated with RFI, Dec.14)

Scenario 4
Move data only to CRV
1) data on CRV
2) voice kept on external infrastructure

(updated with RFI, Dec.14)

- Moving to CRV is the most favorable scenario based on ICAO Survey and RFI Market Survey
- Difference in costs reflect differences in services

Move data only to CRV

Move voice and data to CRV

Migrating voice trims down the costs but needs independent back ups (costs included)

Scenario 1
Do Nothing

(Current costs as per ICAO Survey Jan.14, extrapolated)

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Scenario 4
Move data only to CRV
1) data on CRV
2) voice kept on external infrastructure

(updated with RFI, Dec.14)

Cumulative total (Million US$)

Scenario 5-1 Do Nothing Current estimated costs as per CRV TF/3-WP/02, Dec.14 Yearly service costs (6 States)

Scenario 5-2 Move to CRV critical an other applications Satellite, 2 MBps (based on RFI, Dec.14)

Scenario 5-3 Move to CRV non-critical applications VPN over Internet, 1 MBps (based on RFI, Dec.14)

Scenario 5-4 Move to CRV critical and other applications Private VSAT network, 64 or 128 KBps (based on RFI, Dec.14)

Move to CRV
64/128Kbps, VSAT performance guaranteed

Extra costs

Keep current infrastructure

Moving to CRV will increase costs for small Pacific States and where terrestrial connectivity is poor (last mile, backbone)

Need for a different paradigm (VSAT network, owned or not) … PASNet

C.R.V.

Process

HOW?

CONOPS

Security

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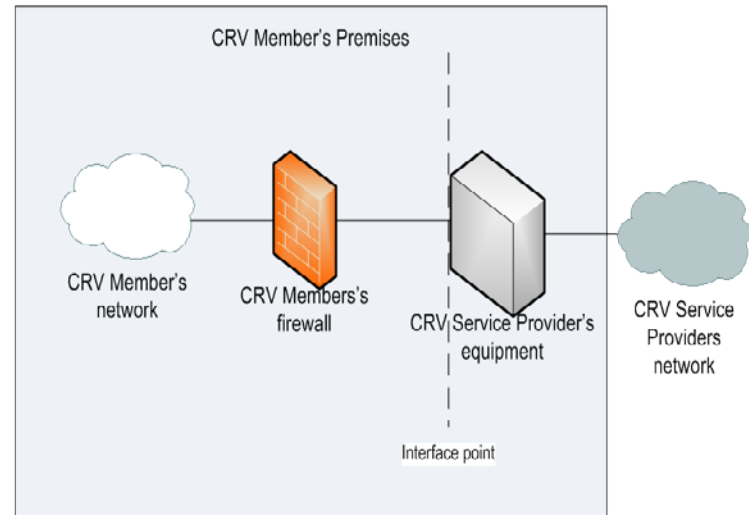
- each user of the network will take responsibility for their own IT security.
- network will support this security by being a closed private network, without access to the public Internet.
- Each Member can (and should) establish IT security protections so that they comply with their organization's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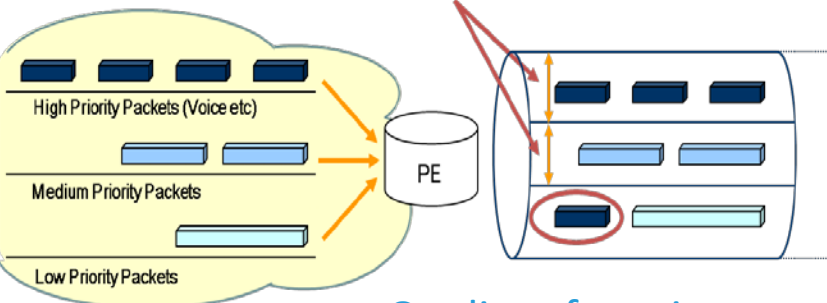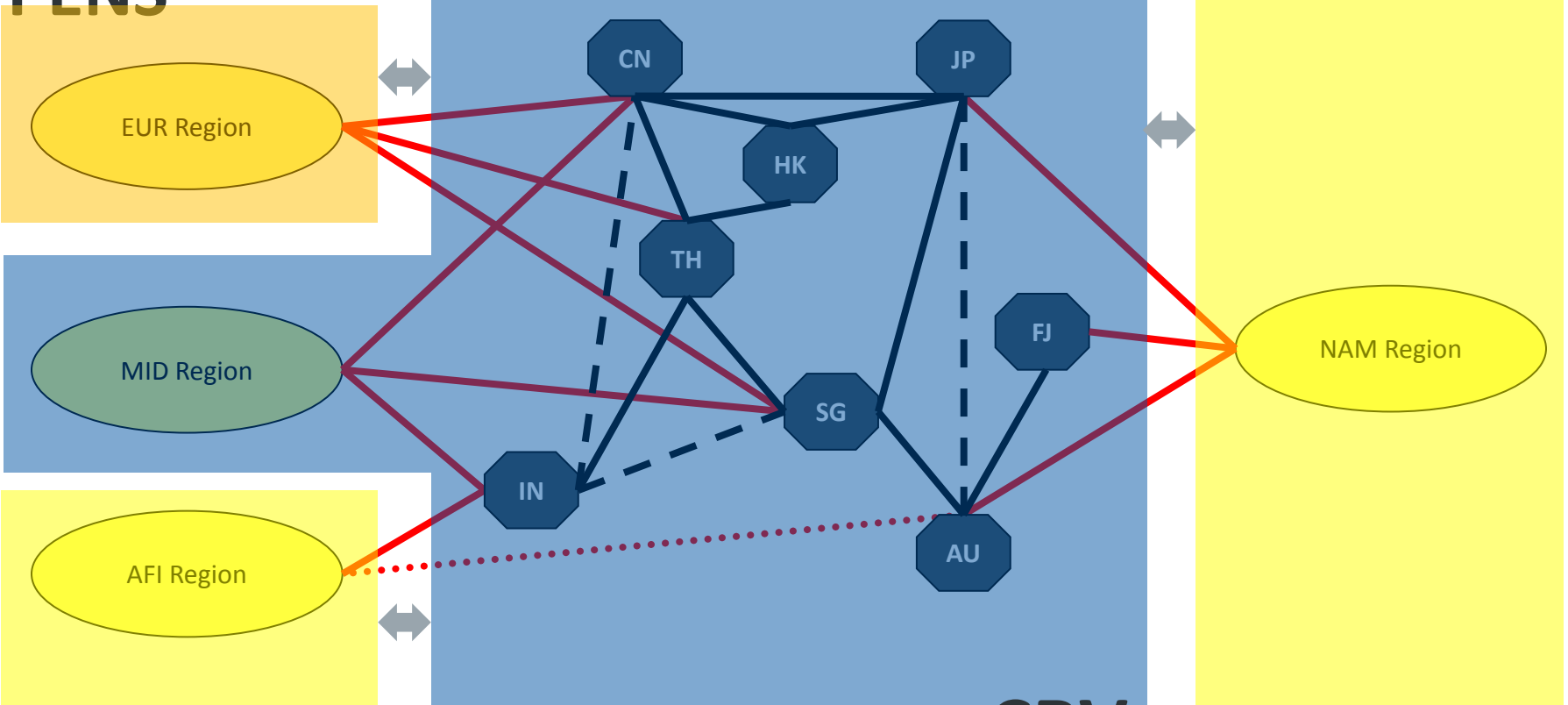

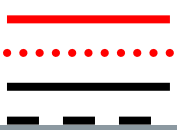## Quality of service

CONNECTIVITY

Example: transport of AMHS
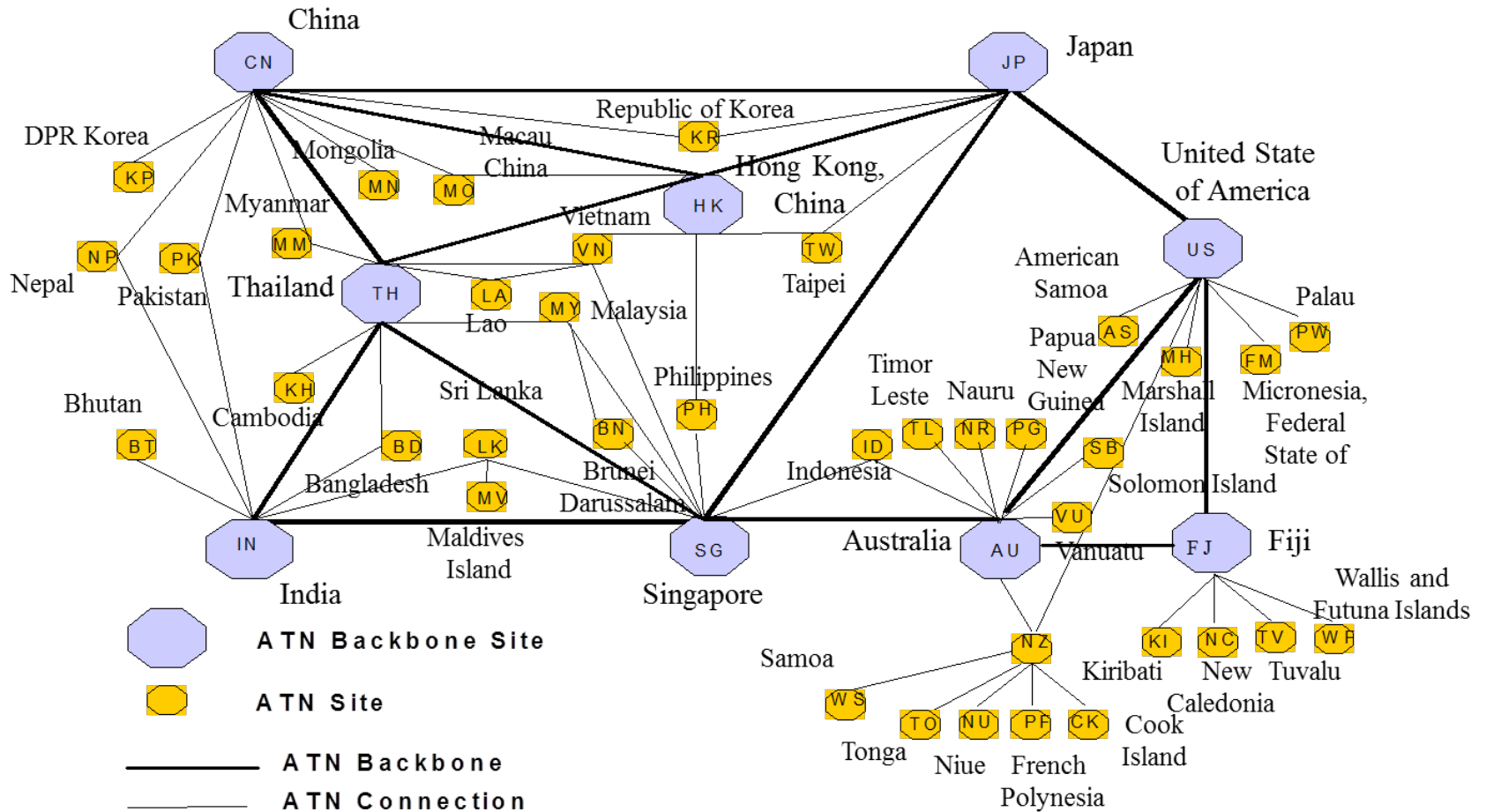
Example: transport of AMHS

PENS

CRV

EUR Region

MID Region

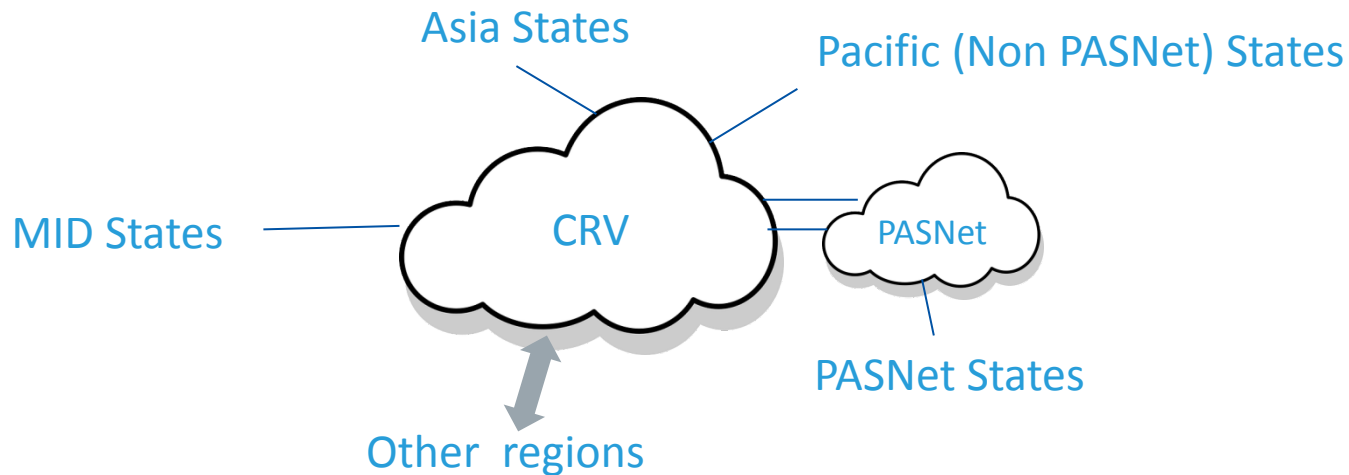AFI Region

NAM Region

CN · JP · HK · TH · FJ · SG · IN · AU

Inter-Regional Trunk Connection
New Inter-Regional Trunk Connection
Intra-Regional Trunk Connection
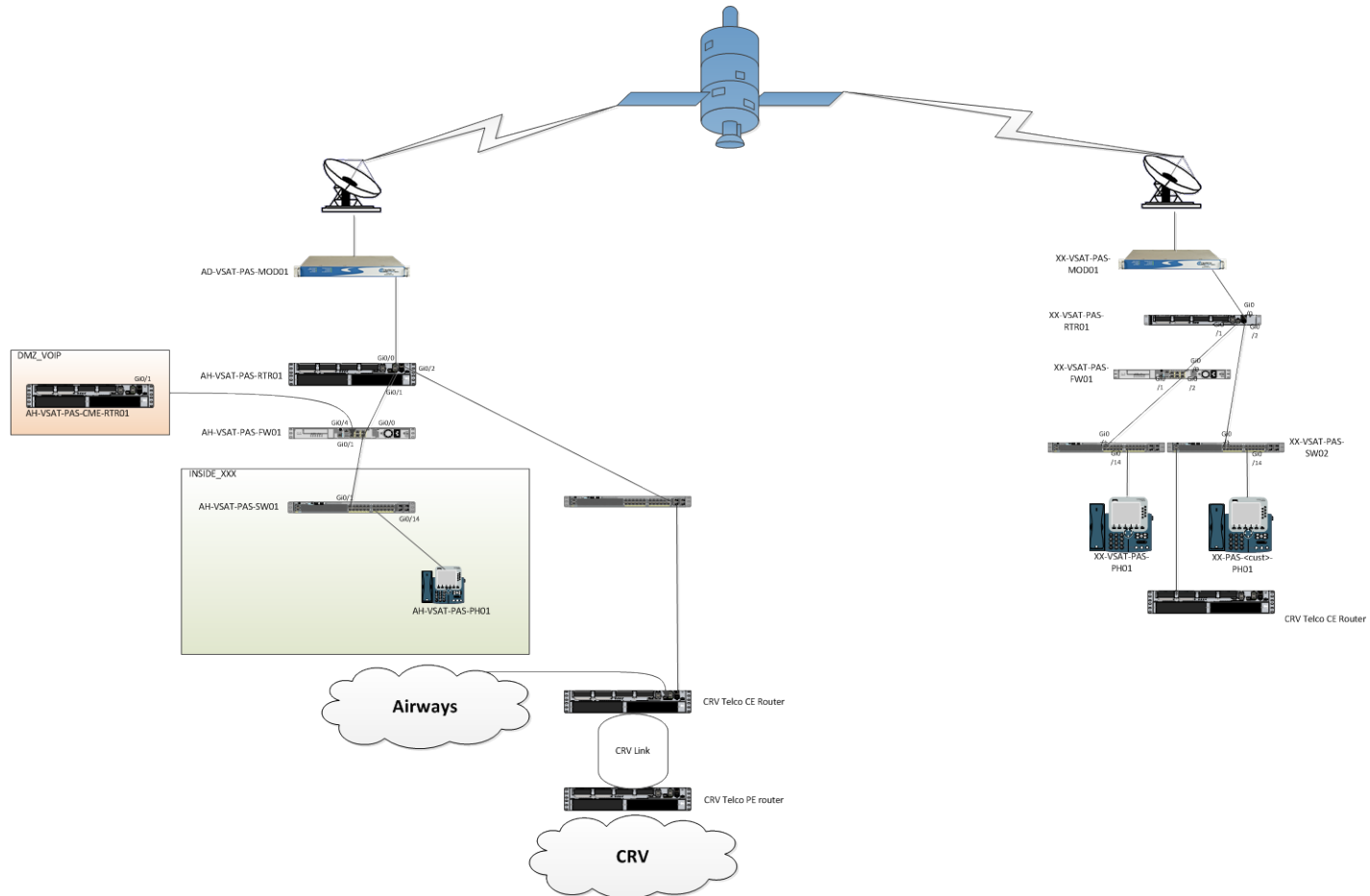New Intra-Regional Trunk Connection

IP network to network

CRV and PASNet

- CRV selected provider interconnects CRV to PASNet Network in the CRV contract
- Performance requirements will not apply end to end

CRV and PASNet

PASNet

PASNet VSAT Sites	State	VSAT Station Funder	Operational	Comments
Christchurch (Hub)	New Zealand	Airways NZ	2004	VSAT Hub including Domestic Links
Auckland	New Zealand	Airways NZ	2004	VSAT Domestic Links
Fua'motu	Tonga	Airways NZ	2008	ADS-B Trail over VSAT commencing October 2015
Vava'u	Tonga	WB PAIP Phase 1	Q1 2016	Supervision and maintenance contracted to Airways NZ
Bonriki (Tarawa)	Kiribati	WB PAIP Phase 1	Q1 2016	Supervision and maintenance contracted to Airways NZ
Kiritimati (Christmas Is)	Kiribati	WB PAIP Phase 1	Q1 2016	Supervision and maintenance contracted to Airways NZ
Funafuti	Tuvalu	WB PAIP Phase 1	Q1 2016	Supervision and maintenance contracted to Airways NZ
Faleolo (Apia)	Samoa	WB PAIP Phase 1	Q1 2016	Supervision and maintenance contracted to Airways NZ
Rarotonga	Cook Islands	NZ MFAT	Q3 2016	Funds released by MFAT. RFP not yet issued
Aitutaki	Cook Islands	NZ MFAT	Q3 2016	Funds released by MFAT. RFP not yet issued
Niue	Niue	NZ MFAT	Q3 2016	Funds released by MFAT. RFP not yet issued
Bauerfield (Port Vila)	Vanuatu	WB PAIP Phase 2	Not yet programmed	
Santo	Vanuatu	WB PAIP Phase 2	Not yet programmed	
Honiara	Solomons	WB PAIP Phase 2	Not yet programmed	
Munda	Solomons	WB PAIP Phase 2	Not yet programmed	
Nauru	Nauru	AusAid(?)	Not yet programmed	

As per September 2015, source ANZ

Notes:
WB PAIP - World Bank Pacific Aviation Investment Programme
NZ MFAT – New Zealand Ministry of Foreign Affairs

Process

- CRV-TF was established in 2013
  - Delivered the Conops and drafted the tender package
  - Selection process through ICAO TCB
  - Pioneer ANSP funded the assistance
  - Pacific Pioneers: Australia, Fiji, France (French Polynesia, New Caledonia), New Zealand
- ICAO Contracts Board has approved the evaluation on 29 Nov. 2016
- CRV-OG will be taking over from Dec. 2016 for managing the network and interfacing with the selected supplier
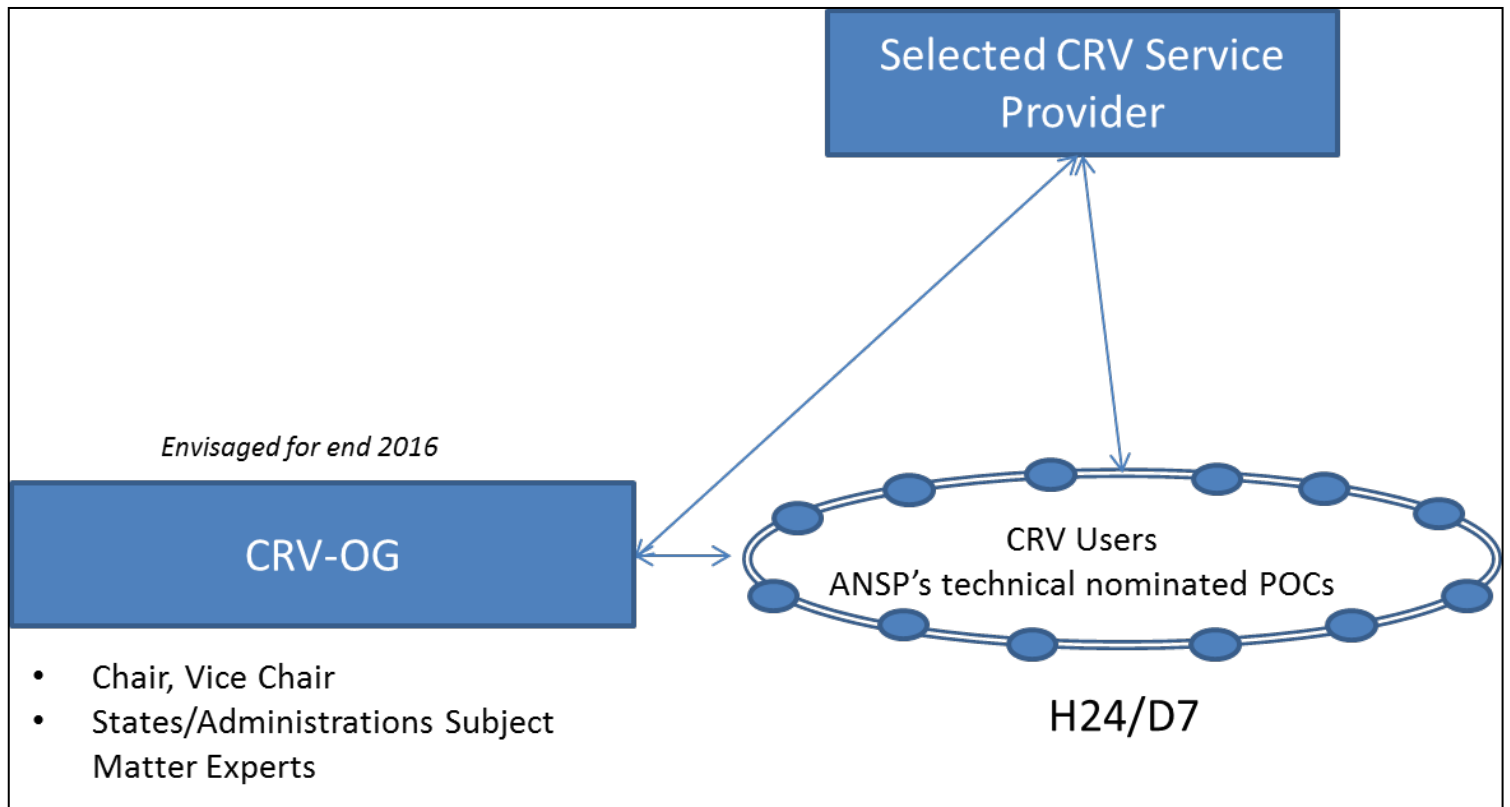
Process

- All States/Administrations (APAC, MID) encouraged to join
- States/Administrations will have to join CRV-OG before signing an Individual Service Contract with the selected supplier
  - A single basis (common provisions) for all ANSP, with selectable services/class of services/options, based on requirements, and associated prices
  - Only existing contracts: signed between each individual State/Administration and supplier
  - No contract between CRV-OG and the supplier
  - No contract between ICAO and the supplier (general case)
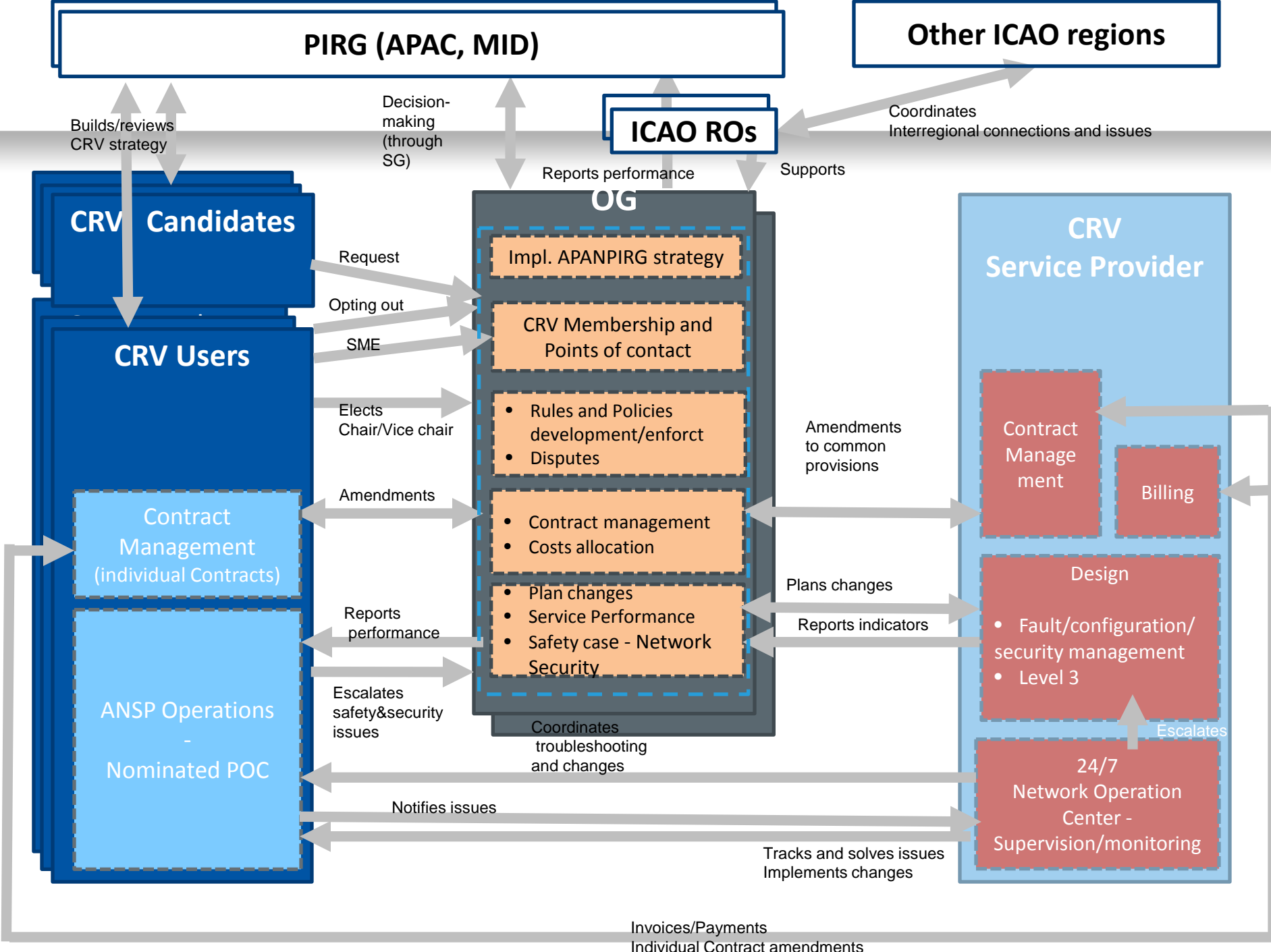- No cost to pay with a local/national service provider, this is a END TO END service (general case)

CRV OG: terms of reference

a)   Oversee the implementation of the CRV post Contract Award;

b)   Manage issues arising from the transition with CRV TF, if any;

c)   Co-ordinate and standardize the establishment or upgrade of CRV services as required;

d) Co-ordinate activities with other ICAO CRV OGs, if any, to make sure that decision making and communication with CRV Service Provider is consistent and timely;

e)   Oversee the performance of the CRV Service Provider, including customer service;

f)   Oversee the performance of the CRV network;

g)   Oversee the escalation and solving by the CRV Service Provider of issues associated with the provision of the CRV, including safety and security related issues;

h)   Assist with the resolution of issues associated with the provision of the CRV among the CRV Users as required, including safety and security related issues;

i)   Assist with the migration of Aeronautical Fixed Services (AFS) onto the CRV, in line with the GANP and seamless ATM plan;

j)   Maintain CRV OG documentation associated with the function, performance and management of the CRV, including the CRV OG Operations Manual, a list of CRV users and a record of variations to the common tender package;

k)   Accept deliverables from the CRV Service Provider on behalf of the CRV Users as required;

l)   Promote the use of CRV; and

m)   Perform any other activity as required by CRV operations.

CRV OG

Selected CRV Service Provider

Envisaged for end 2016

CRV-OG

- Chair, Vice Chair
- States/Administrations Subject Matter Experts

CRV Users
ANSP's technical nominated POCs

H24/D7

Interregional connectivity

- Facilitated by ICAO Regional offices
  - Action IRCM 4/11, Sep.15: Interconnection of Regional IP Networks: the APAC and EUR/NAT Offices will facilitate the arrangements to interconnect the regional IP networks in 2016 with an implementation target date envisaged for end 2017

- May need conclusions/decisions by SubGroups/PIRG

CONCLUSIONS

Conclusions

- The regional target is to have one common IP network for all States/ Administrations in APAC, connected to other ICAO regions, with applications migrated gradually

- PASNet will be interconnected to CRV

THANK YOU

Aviation is safe because it has the culture to learn and react

http://www.icao.int/safety/globaltracking