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INTERNATIONAL CIVIL AVIATION ORGANIZATION
A UN SPECIALIZED AGENCY

Current Status of Pacific Island ATS connectivity

Analysis of the ATS connectivity issues in Pacific Region

CRV Joining process illustration and CRV implementation experience of Fiji

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Pacific Island ATS Connectivity
Nadi FIR

Analysis of the Connectivity Issues
Identifying the real issue

Joining CRV: Fijis experience
Share Fiji's plan in joining CRV

Challenges
Infrastructure & Cost

Possible Solutions
New Technology & Funding

Conclusion

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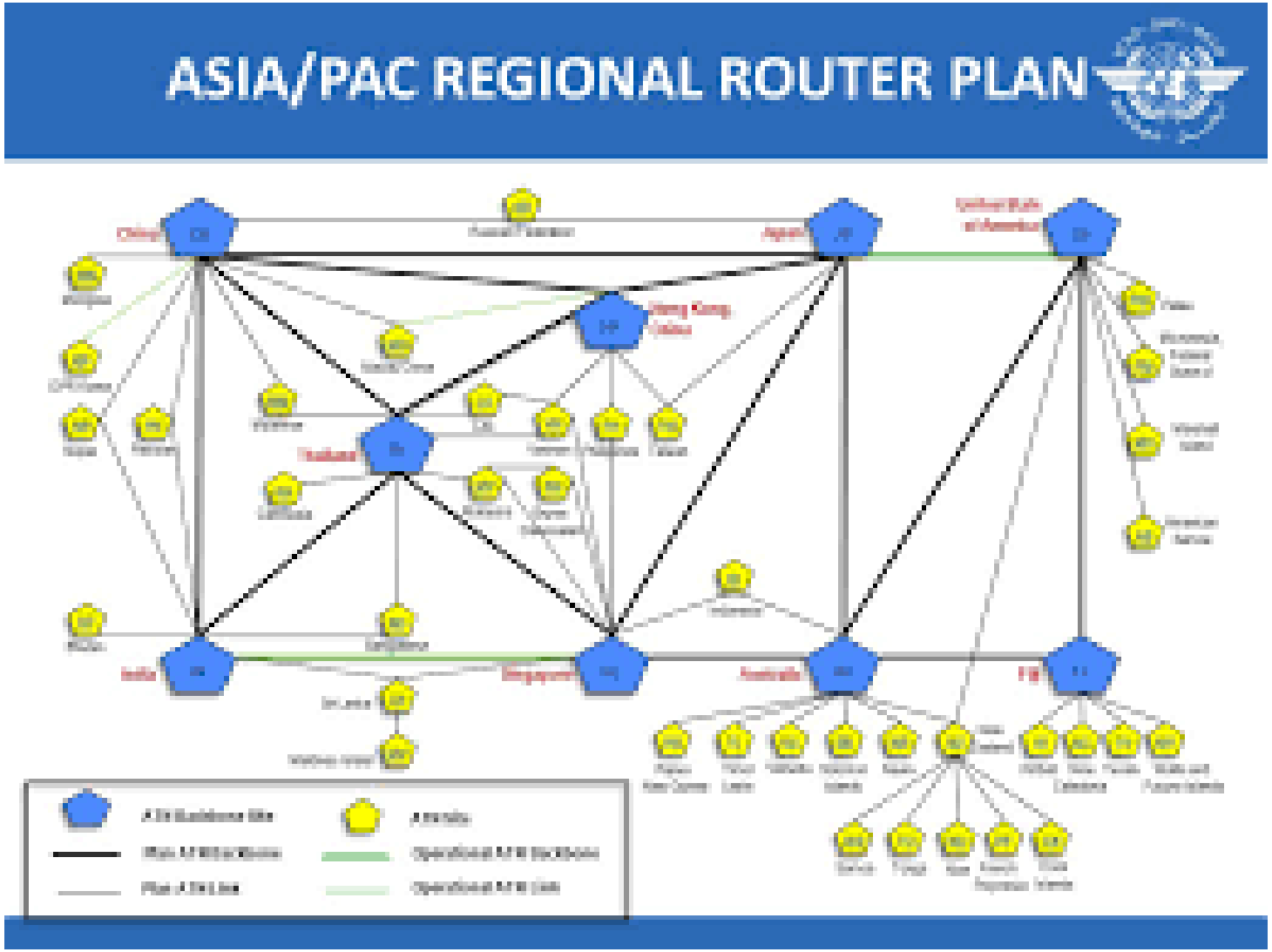
Pacific Island ATS Connectivity

Nadi FIR

- ✓ Nadi support voice and AMHS service to its Pacific neigbouring States within the Nadi FIR that consists of New Caledonia, Wallis & Futuna, Vanuatu, Kiribati & Tuvalu
- ✓ GINCOR a special digital multiplexer system using a 1.0MB internet connection provided the AMHS & Voice circuit to New Caledonia and Wallis & Futuna
- ✓ AMHS service is provided to Bonriki airport, Tarawa, Kiribati using the Fiji Airports website over the internet.
- ✓ Voice/Fax services using Telephone/Fax over PSTN and email provides the connectivity to Vanuatu, Kiribati & Tuvalu
- ✓ Communication network connectivity is provided over the Satellite services and submarine optic fiber cable connectivity is now available

APAC ATN Network – AMHS Services



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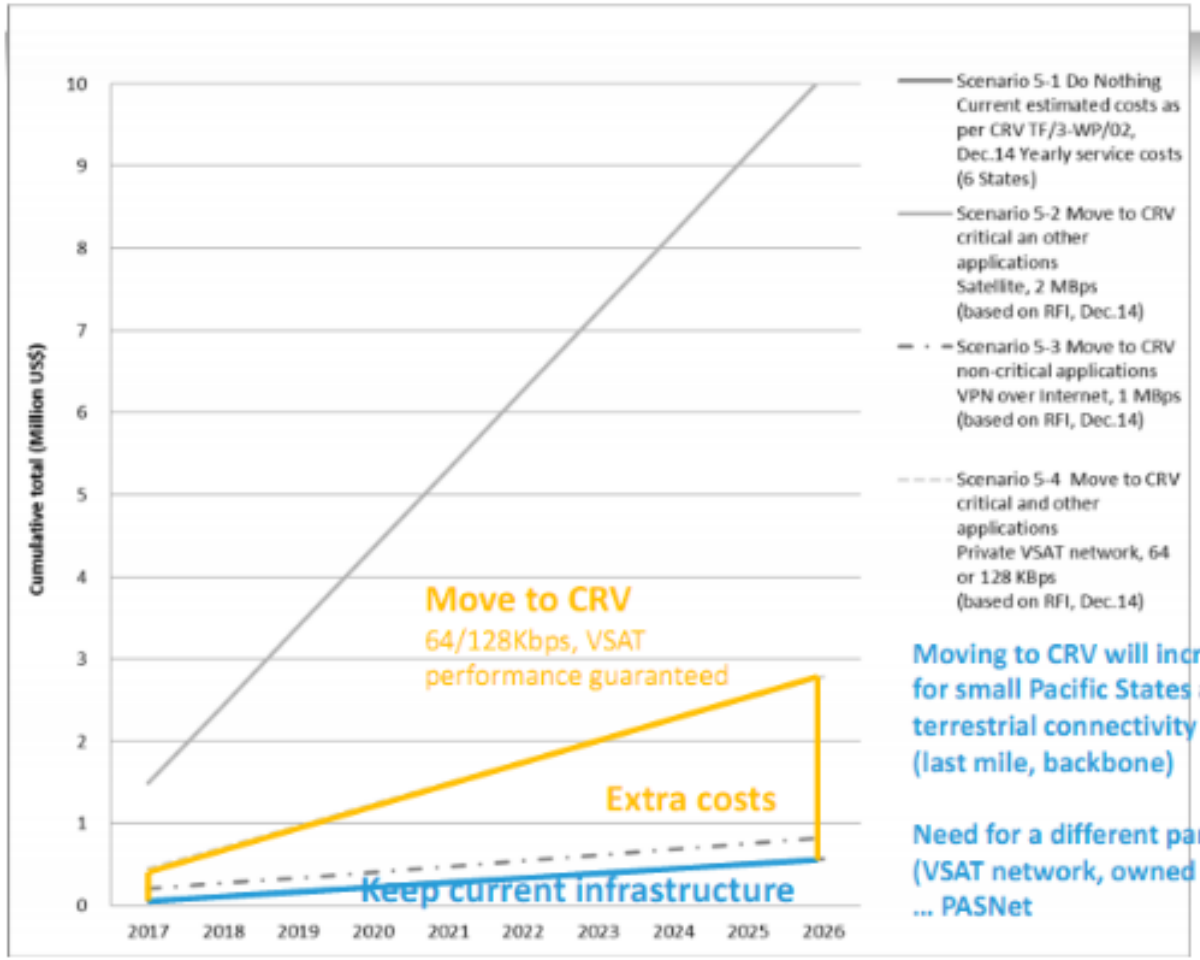
Challenges

ATS Connectivity

- ✓ The major challenges for Pacific Island for ATS connectivity is the availability of reliable communication infrastructure and the operational cost
- ✓ Due to its remoteness, Satellite services was the only connectivity and now with the availability of the Optic fibre will improve the reliability.
- ✓ Communication cost is a challenge when comparing number of air traffic movement to establish a reliable ATS connectivity
- ✓ For States that operates low air traffic movements, it does not provide a business case.

CBA for Pacific Island joining CRV



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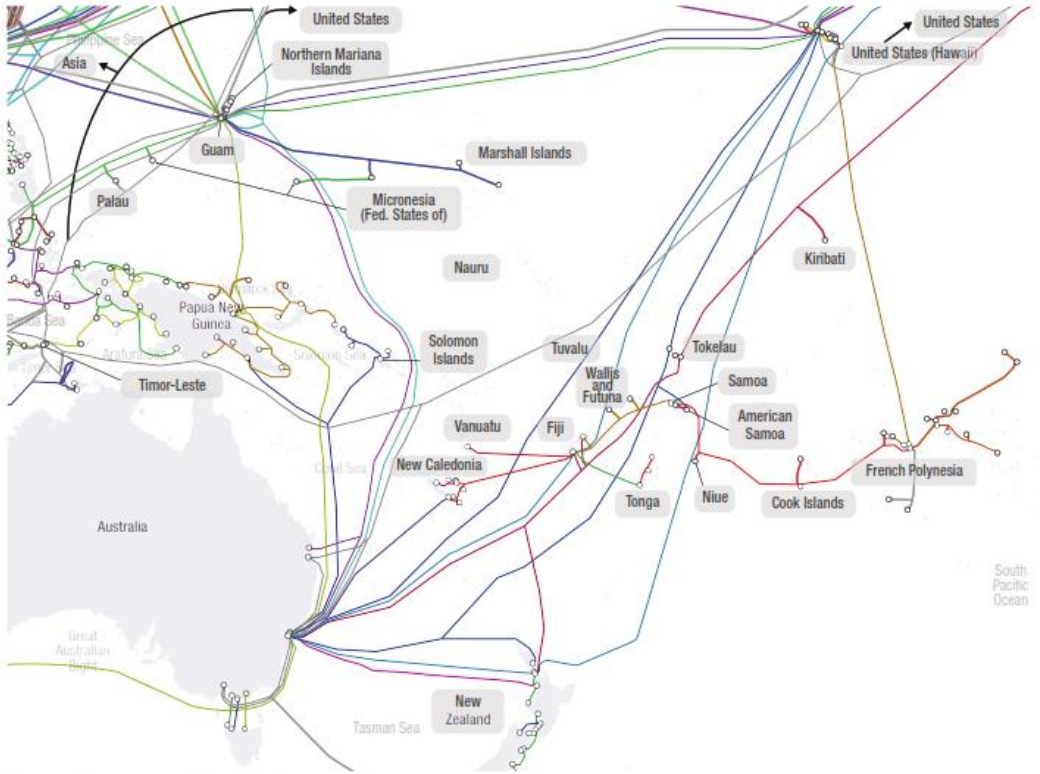
Analysis of the Connectivity Issues

- ✓ The availability of submarine optic fibre cable to many of the Pacific States will improve the communication infrastructure.
- ✓ The availability of low orbit communication satellite providing internet services like Star Link and OneWeb is another alternative for ATS connectivity and presumably with better cost structure.
- ✓ State with low air traffic movement will need to work with its CSP and for better cost model
- ✓ Propose for an alternative solution in joining CRV

Sub Marine cable connectivity in the Pacific

- *Submarine optic fibre cable is almost available on Pacific Island States as shown in the sub marine cable map.*
- *More than one supplier of submarine optic fibre cable to the Pacific.*
- https://www.submarinecablemap.com/landing-point/suva-fiji

Figure II.1. The submarine cable network connecting Pacific SIDS (as of November 2022)



Source: UNCTAD, based on TeleGeography (2022).

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Starlink Satellite Internet Service

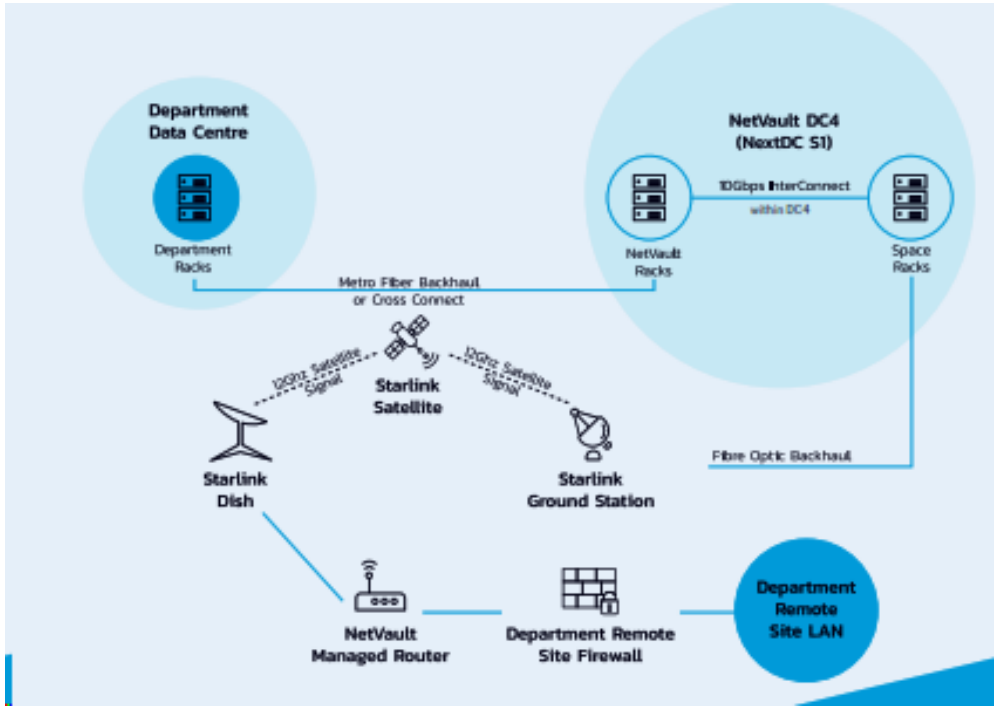
Starlink's current hardware and monthly plan options;

90-240Mbps Download Bandwidth

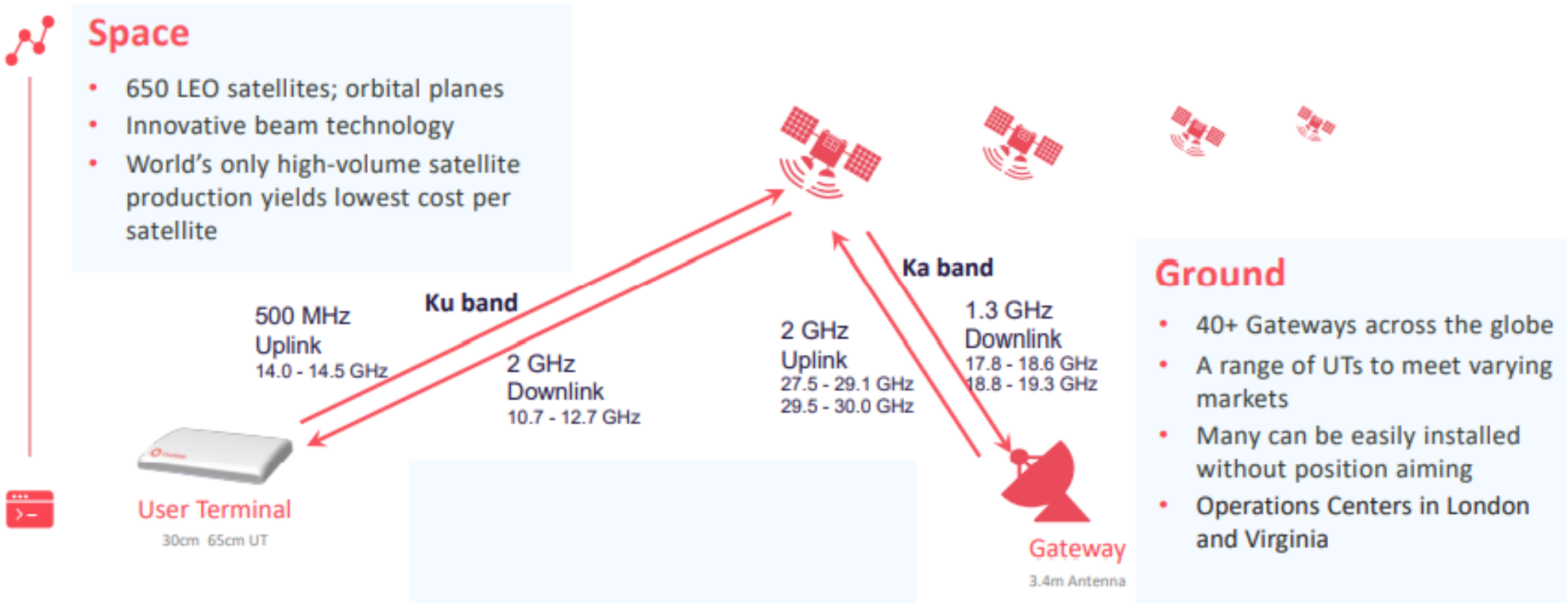
- 10-25Mbps Upload Bandwidth
- 25-60ms latency
- Unlimited Standard Data
- Single Phased Array Antenna

120-270 Mbps Download Bandwidth

- 12-35Mbps Upload Bandwidth
- 25-60ms Latency
- 1TB, 2TB, 6TB Priority Data Options
- Unlimited Standard Data
- Prioritised Network Access
- Priority Support
- Ruggedised Hardware - Single Phased Array Antenna



OneWeb Satellite Internet Service



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Possible Solutions

- ✓ Conduct a CBA between available submarine optic fibre cable and low earth orbit satellite internet services like Starlink & One Web in joining CRV
- ✓ Seek Government or donor agency assistance for funding .
- ✓ Determine if ICAO can assist in arranging funding assistance for the CRV connectivity
- ✓ For the support of current and future CRV services like SWIM, it is recommended that Pacific Island joined CRV.

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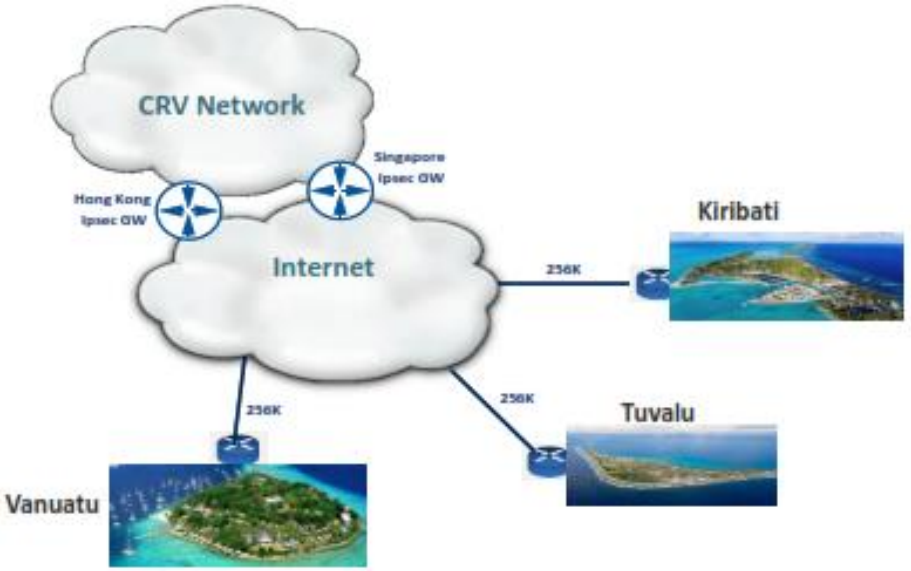
Proposed CRV Solution using CRV Package D

PCCW Global High Level CRV Package D Network Architecture for Pacific Islands

3-May-2021



Remarks:
The Internet link is provided by the customer. The Internet is required to have at least 1 fixed public IP address with symmetric upload/download bandwidth and this Internet link should be dedicated for CRV network.
The Internet security is responsible by customer.
It is recommended to purchase 1 cold standby spare NID onsite (customer will assist to switch over the NID when required)

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#	State	ATC Center/Tower	Service	Bandwidth	Bandwidth Required
1	Vanuatu	Port Villa	AMHS/AFTN	64K	256K
			Voice (VoIP)	112K	
2	Kiribati	Bonriki	AMHS/AFTN	64K	256k
			Voice (VoIP)	112K	
3	Tuvalu	Funafuti	AMHS/AFTN	64K	256K
			Voice (VoIP)	112K	

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Joining CRV: Fijis experience

- ✓ Following the successful CRV POC Australia, New Zealand and USA, Fiji commence the scoping of the CRV service requirement
- ✓ Determine the current service requirement for Voice & AMHS service
- ✓ Calculating the bandwidth requirement as provided in the CRV System Engineering Plan (SEP)
- ✓ Using the SEP, determine the CRV Package based on the service requirement and the function. Fiji is a ATN BBIS State and will require a reliable connectivity. For small ANSP cost is a factor in determining the right CRV package.
- ✓ CRV operates on a Multi-Protocol Label Switching (MPLS) network consist of the Provider Edge (PE) where the POP resides and the Customer End (CE) router .
- ✓ Bi-lateral agreement with connecting ANSP for testing and migration of services to implement CRV

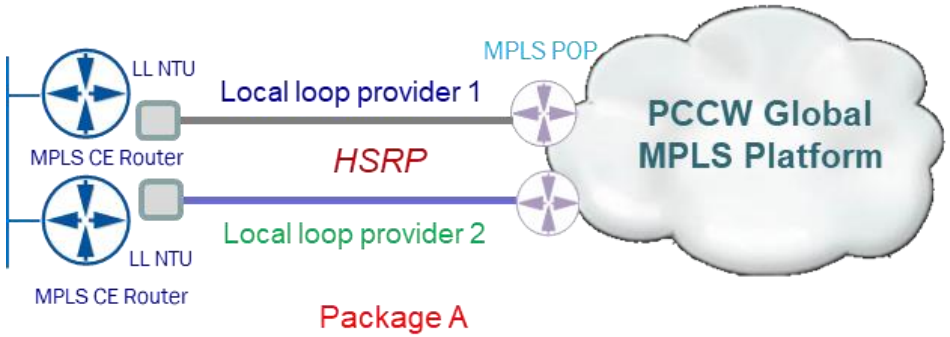
CRV Services & Bandwidth Requirement

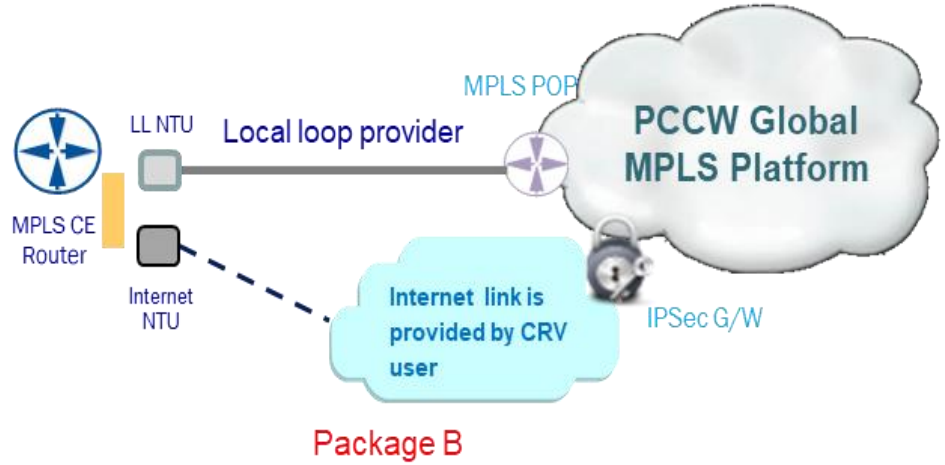
#	CRV Service Type and No. of Services	Connecting Center/State	Bandwidth Requirement (KB)
1	Voice x 2 circuit	Brisbane center (Australia)	224 KB
2	AMHS x 1 circuit	Brisbane center (Australia)	64 KB
3	Voice x 1 circuit	Auckland center (NZ)	112 KB
4	Voice x 1 circuit	Oakland center (USA)	112KB
5	AMHS x 1 circuit	Salt Lake centre (USA)	64 KB
6	**Total**		**578 KB**

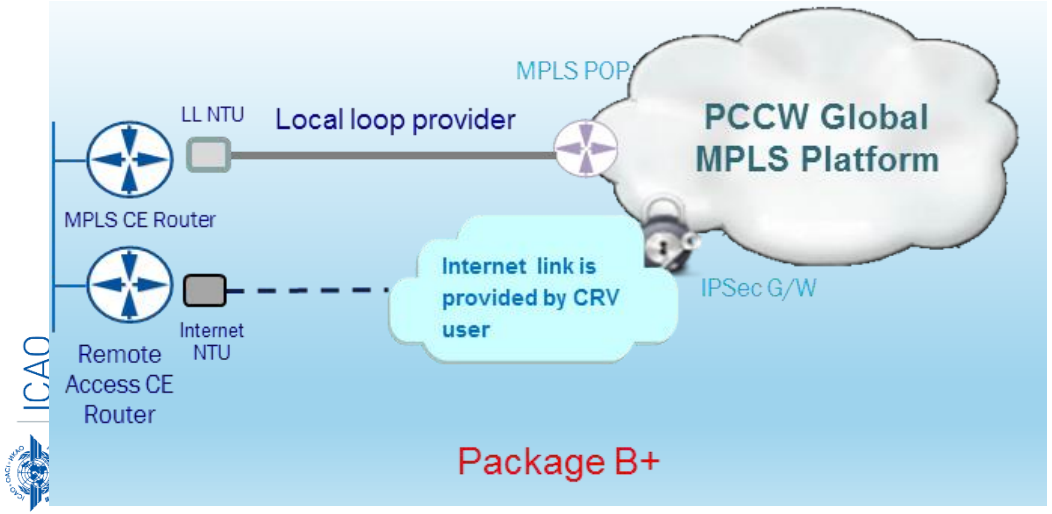
FIJI CRV SYSTEM ENGINEERING PLAN (SEP) BANDWIDTH PLAN

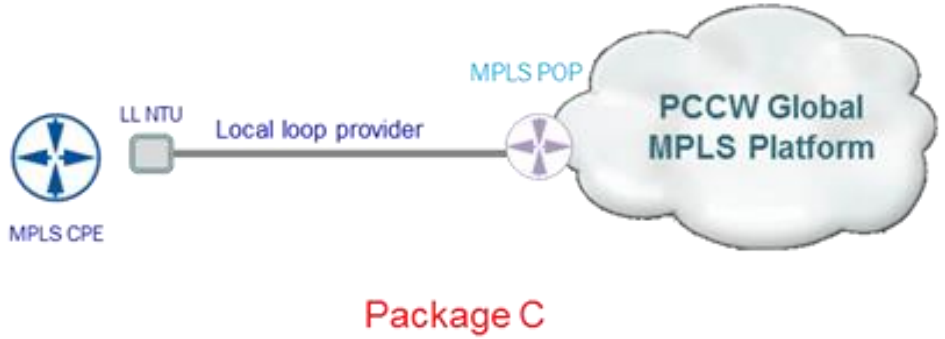
Site ID	Package	Local Loop Bandwidth	MPLS Port Bandwidth	Total Voice Bandwidth (EF)	Total Data Bandwidth (AF21)	Others Bandwidth (DF)
67901	C+	768K	768K	416K	128K	224K

Determining the right CRV Package



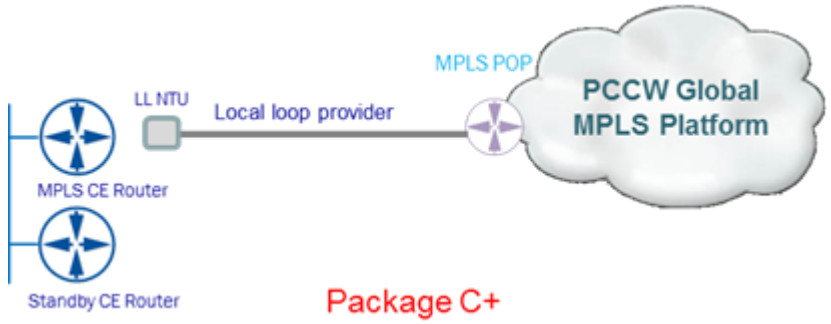




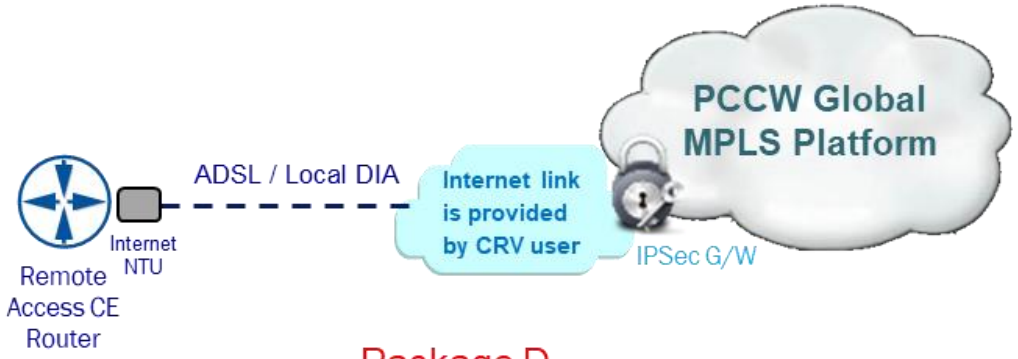


Fiji is using CRV Package B+

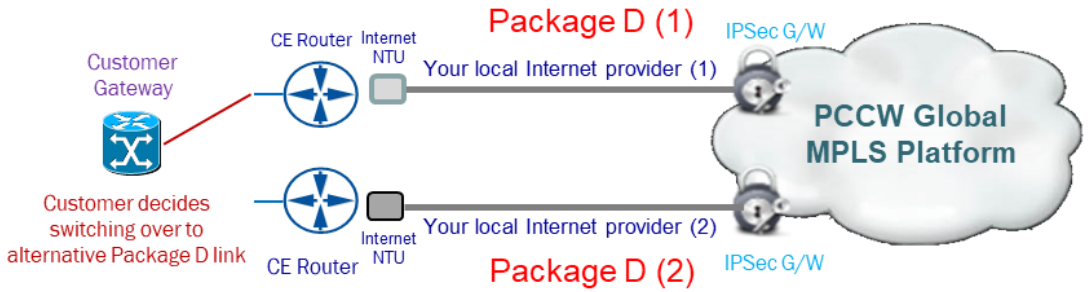
CRV Packages

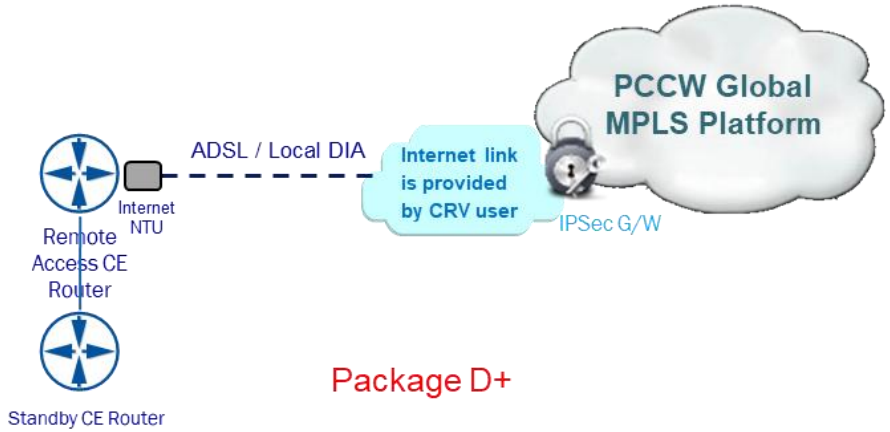


Package C+



Package D





Package D+

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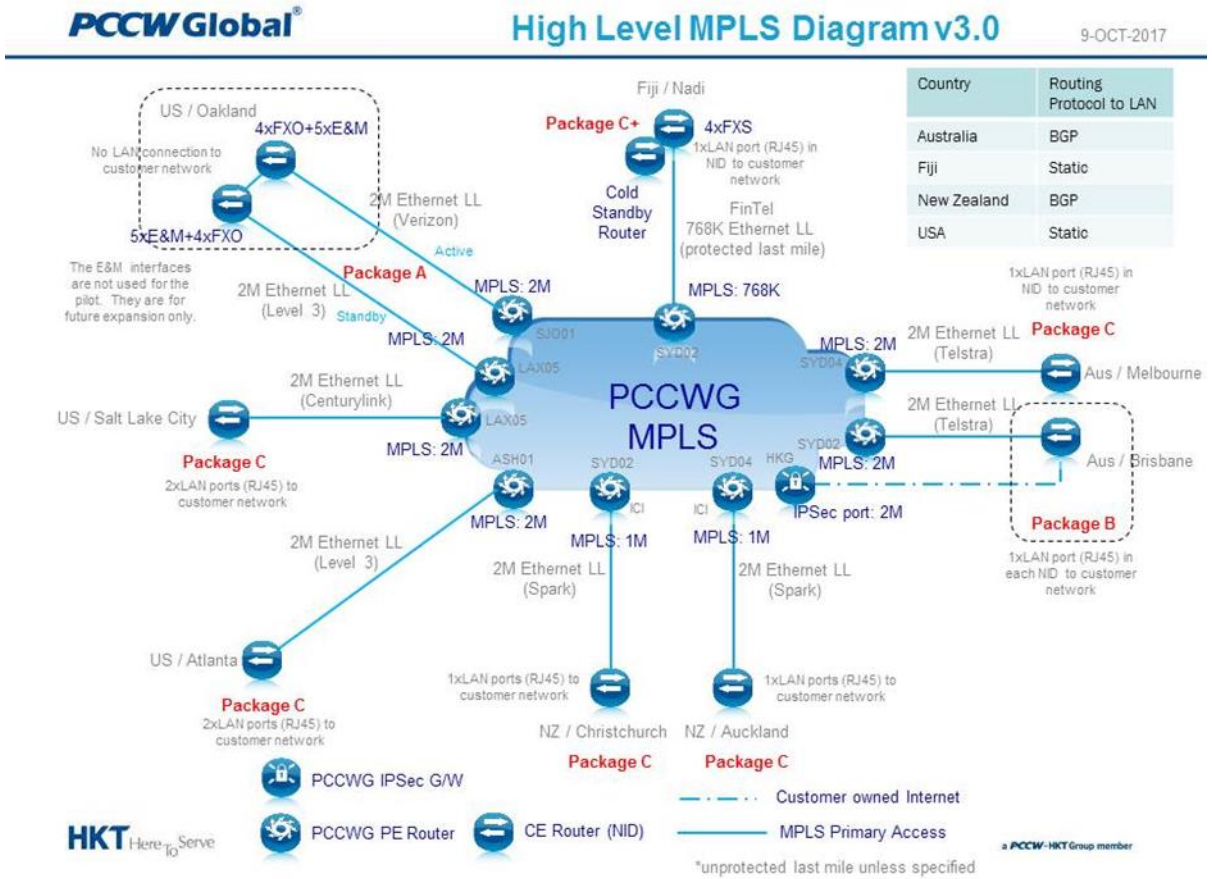
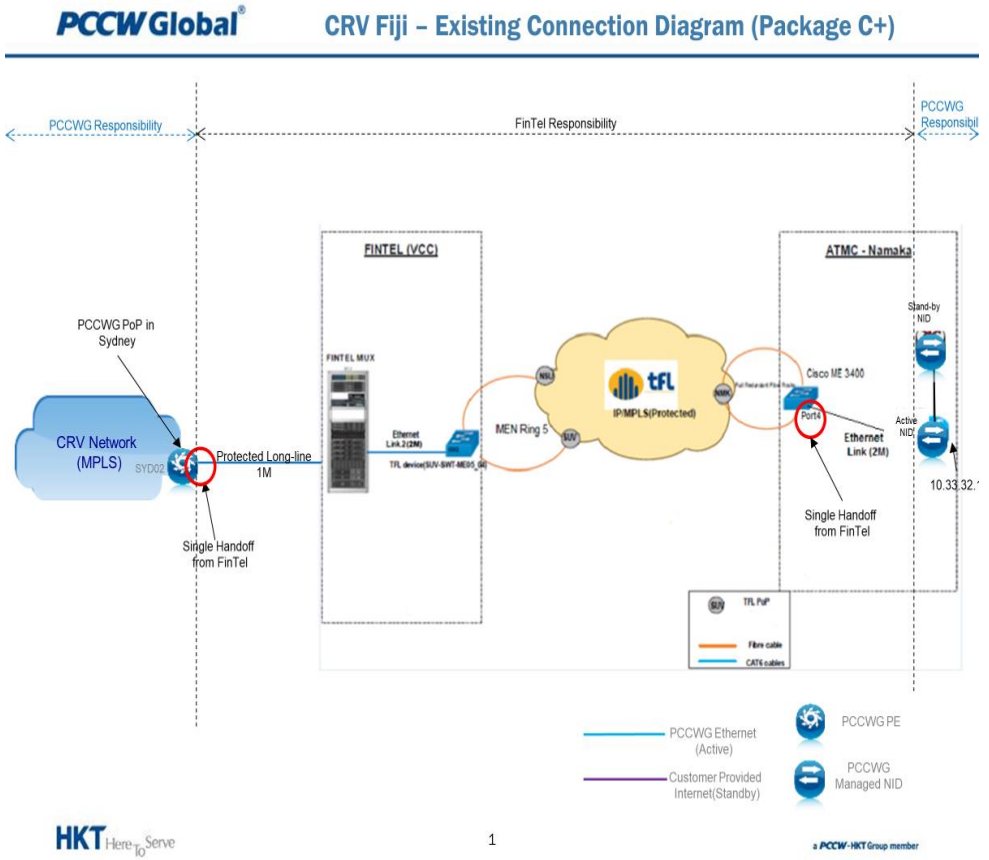
CRV High Level Design – CRV Package C+ Initial Procurement





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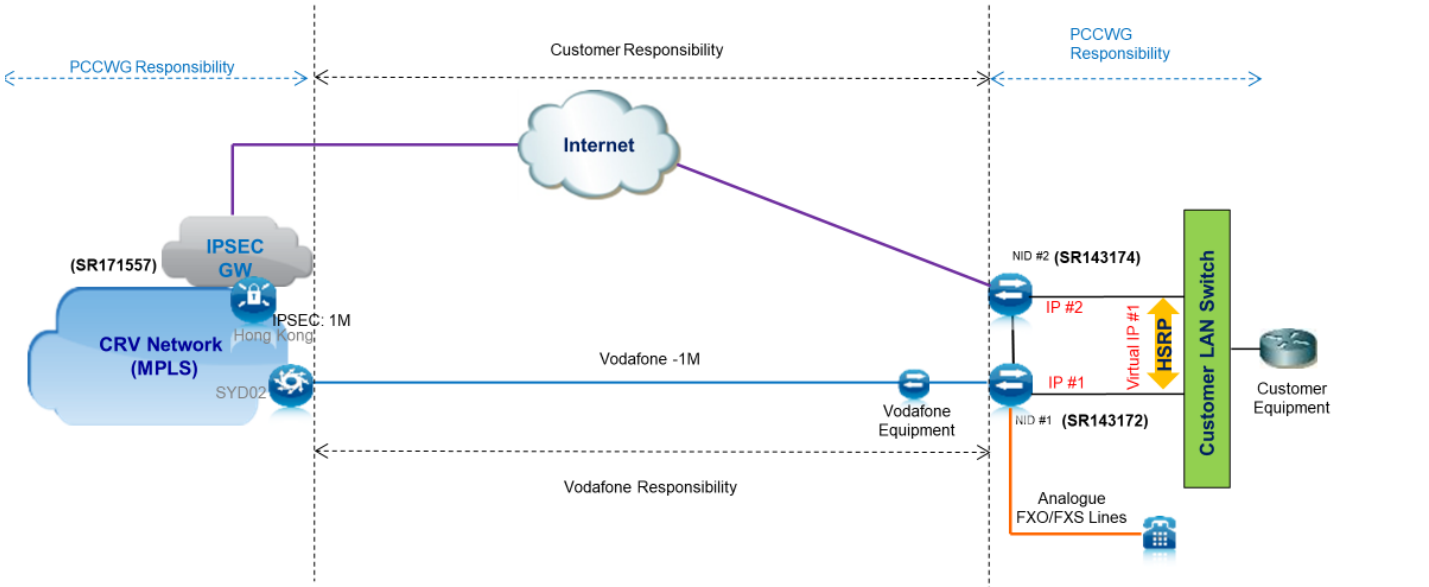
CRV High Level Design – Upgrade to CRV Package B+

PCCW Global

CRV Fiji – Proposed Upgrade Diagram (Package B+)



Remarks:

- Customer need to prepare a LAN Switch to connect 2 Circuits and Customer Equipment
- Customer need to add the connection(patch cable) from the 2 x NID to Customer LAN Switch
- HSRP will be configured for dual links(MPLS- active, Internet-Backup) which are in active and standby mode of operation
- Customer assign LAN IP for 2 x NID and HSRP Virtual IP
- Customer equipment will use HSRP Virtual IP as Gateway
- Customer Analog voice lines will be connected to the NID #1 (Primary link router)
- Customer need to manual fail over the Analog voice lines to NID #2 (Backup link router) in case the router failure.

PCCWG Ethernet (Active)
Customer Provided Internet(Standby)
PCCWG PE
PCCWG Managed NID

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a PCCW-HKT Group member

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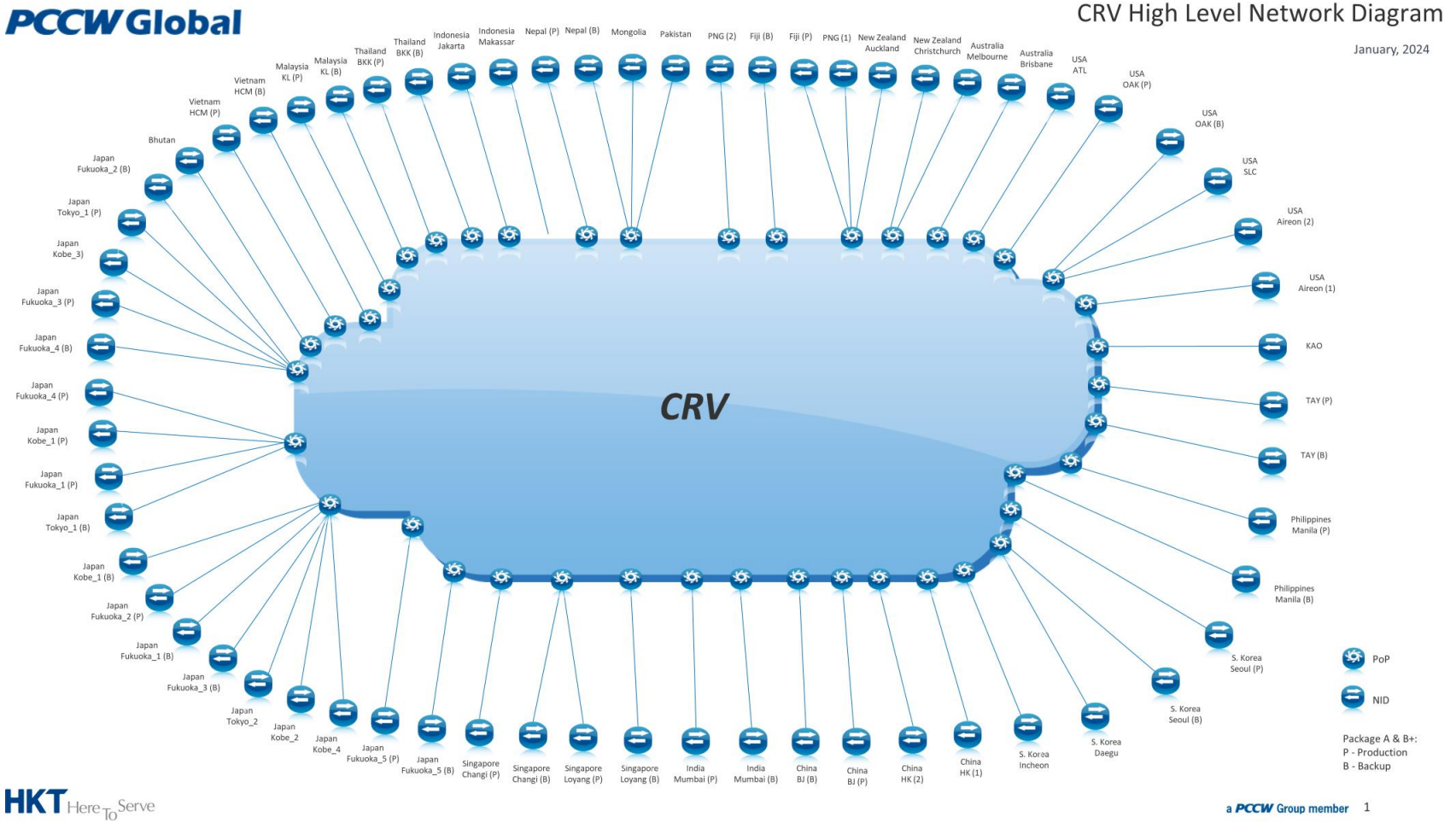
CRV Connectivity High Level Diagram



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Conclusion

- ✓ Communication infrastructure & cost is the challenge faced by Pacific Island on ATS connectivity.
- ✓ Low aircraft movement may discourage Pacific Island in joining CRV based on CBA.
- ✓ Availability of submarine optic fiber and new low orbit communication satellite like Star Link and One Web provided for the reliable communication infrastructure in the Pacific Island.
- ✓ Seek funding assistance for joining CRV
- ✓ For the support of current and future CRV services like SWIM, it is recommended that Pacific Island joined CRV
- ✓ CRV Operations Manual provides for the process and procedure in joining CRV

Thank You!

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