International Civil Aviation Organization

Workshop and One Day PSIDS meeting for preparation of new-CRV requirements and specifications for future SWIM/other aviation services

Guam, USA, 17-20 September 2024

Agenda Item 3: New CRV Technical Specifications including SWIM requirements.

CURRENT CRV ARCHITECTURE

Airways New Zealand

SUMMARY

This paper presents information on the construction and capabilities of the current CRV network.

1. INTRODUCTION

1.1. The Common aeRonautical Private Network (CRV) was created to replace the multiple, legacy point to point telecommunication networks throughout Asia Pacific, with the aim to ensure all states become connected in a cost-effective way.

1.2. The resulting network has been implemented against a set of criteria that have become the standard operating condition for the network.

2. DISCUSSION

3.1. The criteria for the network is as follows:

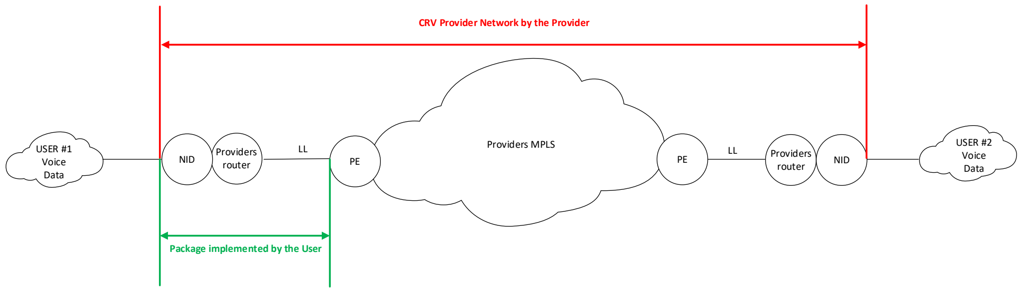
1. Latency
2. Availability
3. Jitter
4. Packet Loss
5. QoS/DSCP
6. Security
7. Voice

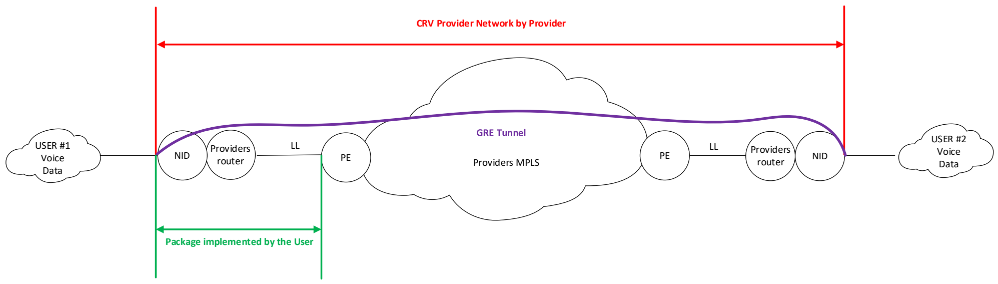
3.2. The architecture of the network is based on PCCWG global MPLS network utilising local providers to provide the local loop or last mile. This may involve a local providers router or NID to be installed which connects to the PCCWG supplied CRV NID. The NID then connects to the State or Users network.
This is shown in the next two images.

2.3. Generic Routing Encapsulation (GRE) tunnels provide the connection between the NIDs based on the details from the System Engineering Plan (SEP). If a new interconnect is required, PCCWG is required to create a new GRE between the users.

All traffic is transported over a single GRE tunnel between the connected users.

2.4. The limitation on the number of GRE Tunnels is based on the number of sub interfaces available on the NID, complexity of the network and management of the network.





2.5. Latency

The latency of the network at a high level is expected to be as per the following table.

Locations	**Average Round Trip Delay**
Within the cities specified in Asia (On-net/Off-net)	200ms
Within the cities specified in Oceania (On-net/Off-net)	200ms
Between the cities specified in Middle East & Europe (On-net/Off-net)	200ms
Within the cities specified in Europe (On-net/Off-net)	200ms
Other cities combination not specified above	600ms

Examples from Global Ping Statistics - WonderNetwork

1. Atlanta to Auckland 271.543ms
2. Mumbai to Singapore 56.29ms
3. Tokyo to Atlanta 161.177ms

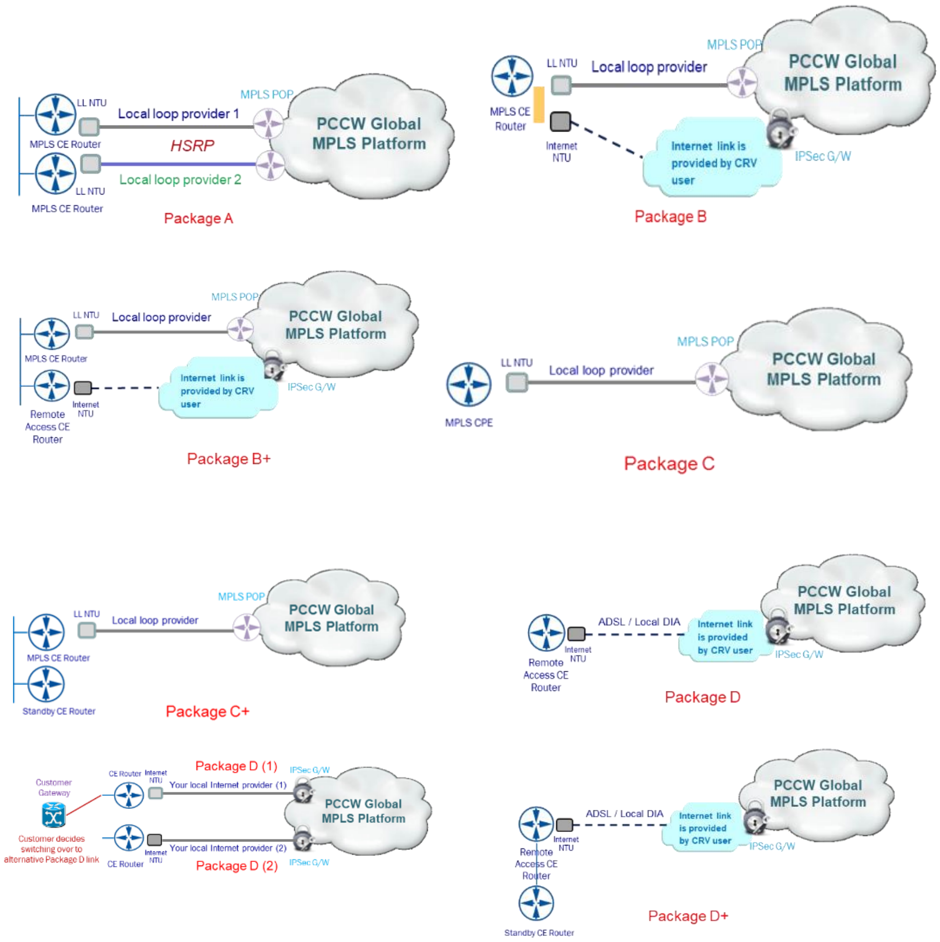
Also Google as an example from Guam 176ms average.

2.6. Availability

The availability of the network is provided in the table below. The availability is achieved via different packages that is chosen by the user during the design phase. Several factors are considered as part of this selection such as cost, capability of the users current network and services being provisioned over the network.

It should be noted that all variations on Package D are internet based and the internet connection is provided by the user and is an additional cost. Other packages also offer the internet as a redundant path, and there are options of a redundant router on other packages.

Service Package	**Service Availability**	**Internet**	**Extra router**	**Cost**
Package A	99.97%	N	N	Most expensive
Package B	99.5%	Y	N	
Package B+	99.95%	Y	N	
Package C	99.5%	N	N	
Package C+	99.7%	N	Y	
Package D	99.5%	Y	N	Most affordable
Package D+	99.5%	Y	Y	



2.7. Jitter

The Target Average Jitter Level for voice application and data application is 15ms and 250ms respectively.

Examples from the portal.

2.8. Packet Loss

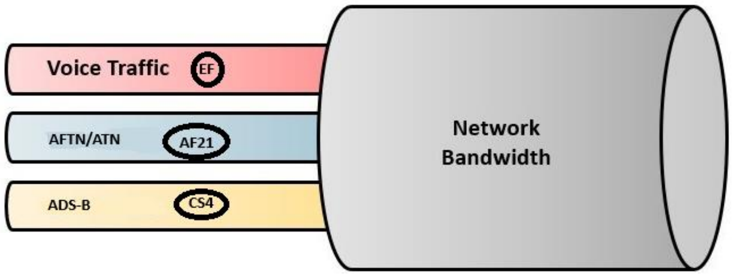
The Target Average Package Drop Ratio for voice application and data application is 0.1% and 0.5% respectively.
Examples from the portal.

2.9. Quality of Service (QoS)/Differentiated Services Code Point (DSCP) markings.

We have 6 DSCP markings allocated and using this in three queues Gold (EF), Silver (AF21), Bronze (DF).

As all of the traffic is delivered via the same GRE tunnel between users, QoS is implemented to ensure that critical applications such as voice are protected to ensure guaranteed delivery. This requires applications to be marked with the appropriate DSCP marking before entering the NID or be identifiable so that the application can be marked by the NID.

Service class name	**DSCP Name**
Border Gateway Protocol (BGP)	CS6
Voice	EF
Voice Signaling	CS5 (preferred) EF (if CS5 is not possible)
ADS-B	CS4
AFTN, ATN.	AF21
SWIM	TBD
All traffic not otherwise defined.	DF (CS0)



Provision of testing and development markings is being considered, as well as other queues to support new services.

Cisco offer details on a 4, 8 and 12 QoS strategy - QoS Strategy Models > QoS Design Principles and Best Practices | Cisco Press

2.10. Security

Security is the responsibility of each of the users. Basic security is provided by CRV SERVICE PROVIDER utilising Route Filtering and GRE tunnels between ANSP sites.

This is per ICAO Annex 17 4.9.2.

Where a user does not have a firewall, basis zone based firewalling is provided on the PCCWG NID.

2.11. Voice

Voice over the CRV network has some specific requirements. This can be found in the Voice ICD.

The network currently supports analog voice by interfaces provided on the NID by the service provider as well as VOIP.

The CRV OG maintains a dial plan for the network.

3. ACTION BY THE MEETING

3.1. The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate.

– – – – – – – –