PCCW Global

CRV for Middle East States

13-14 Oct 2019

HKT Here To Serve a PCCW Group member

Objectives

- Introduction of CRV initiatives
  - To fulfill ICAO requirements
- Recap CRV benefits and offers
- One-on-one meeting with individual State
  - To understand specific requirements and concerns
  - To review the solution commercially and technically
  - To discuss the System Enginneering plan to CRV

Feb, 2018

Agenda

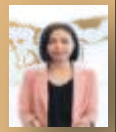
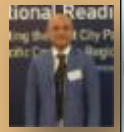
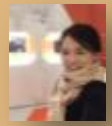
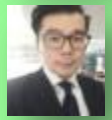
- PCCW Global Introduction
- Our Journey to CRV
- Why CRV ?
- CRV package and ordering
- CRV scope and provisioning status
- Regional Capabilities in Middle East
- Proposed Solution
- Provisioning, Operation support
- Q&A

PCCW Global Introduction

PCCW Global

CRV Support Team

PCCWG support team to CRV

Account Management		Solution Consultant		Product management		Project Management		Engineering Team		Operation		Customer Service	
Bowie Lam, Sales Manager		Gigi Chan, Senior Consultant		Mandy Keung, AVP		CK Mak, Program Director		Boaz Lau		Mak Hin Ming, AVP		Lorraine Kwan, Regional Services Manager	
Benny Cheng, AVP		Eddy Lee, AVP		Ho, Louis, VP		Kenny Lee, VP		Raymond Tang, Technical Manager				Woody Chan,AVP	
		Mohamed Mahgoub, VP		Jordick Wong, SVP				Hon Chan, AVP				Eleni Koutsopoulos, VP	
Raymond Luk, VP						Scott Butterworth, VP							
Frederick Chui, CCO						Sunny Yeung SVP							

HKT Here To Serve a PCCW Group member

CRV Main Contact

Ms Bowie Lam

Sales Manager

Strategic Account Management

PCCW Global Ltd

Tel: +852 28838905

Mobile/WhatsApp:

+852 63810415

Email: bowiel@pccwglobal.com

www.pccwglobal.com

Our Parent Company: HKT

- PCCW Global is an international operating division of HKT, Hong Kong's premier telecommunications service provider, majority-owned by PCCW Limited.
- In 2014, HKT acquired CSL, Hong Kong's first mobile operator. Launched in 1983, CSL is at the forefront of delivering world-class network built above GSMA standards.
- PCCW Global is able to take local innovations in media, broadcasting, smart city solutions and reach out to global audience.

*Source: Gartner 2014

HKT

- Headquartered in Hong Kong
- Founded in 1925
- 2017 Revenue: US$4.3 billion
- Employees: 17,600
- Number 1 Provider to consumers and enterprises
  - local quadruple-play services:
    - Fixed
    - Broadband
    - Mobile
    - Pay TV
- Listed on the Hong Kong Stock Exchange in 2011
- China Unicom is the 2nd largest shareholder of HKT

630,000
Kilometres of Diverse Cable Capacity Globally

17 Tb/s
of Global Fibre Capacity

Tier 1
Transit Free Network

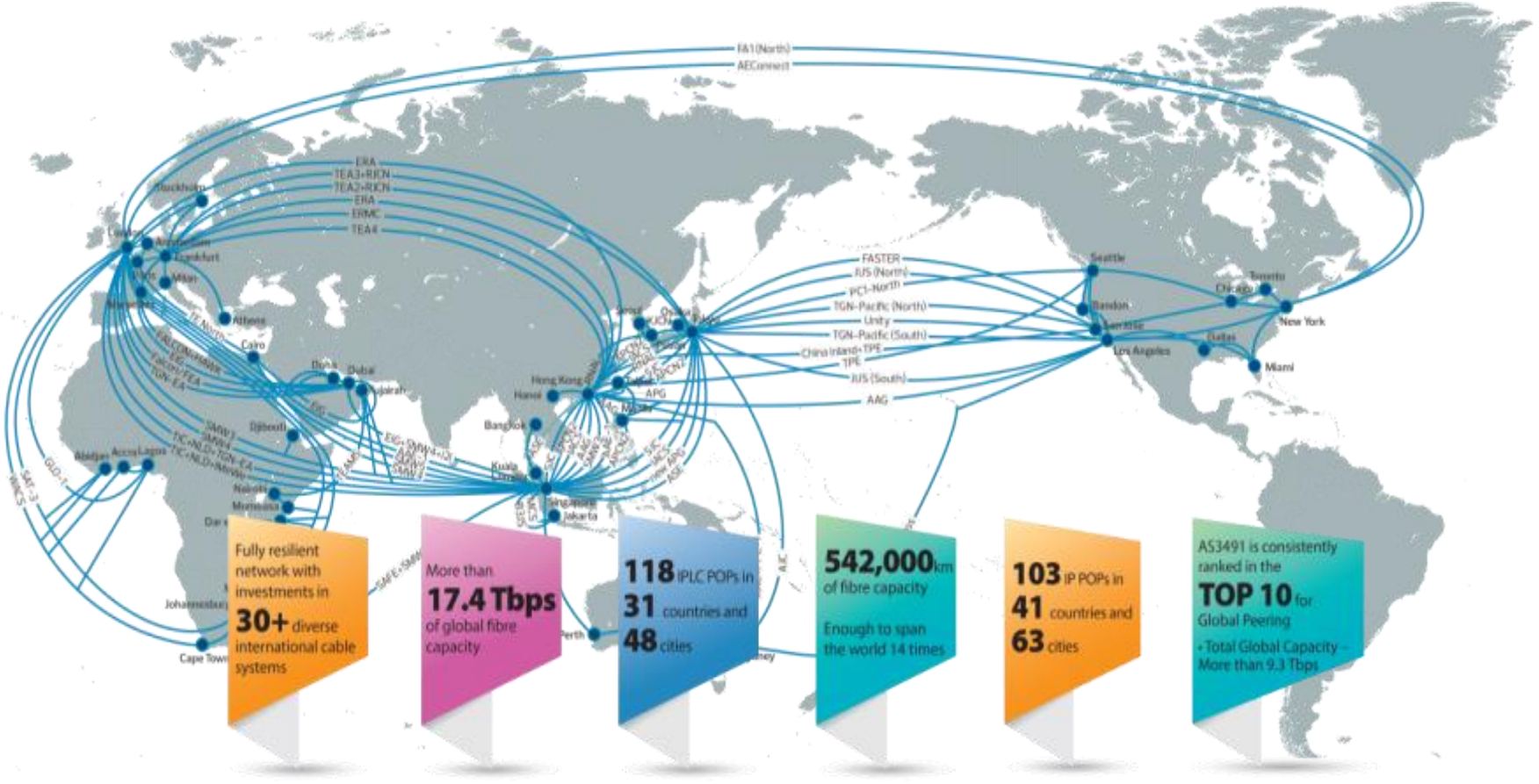
2T+
Direct IP Connectivity with Greater China Carriers and OTTs

Leader in Voice Retail Outsourcing with Access to **>1,000** Mobile Networks

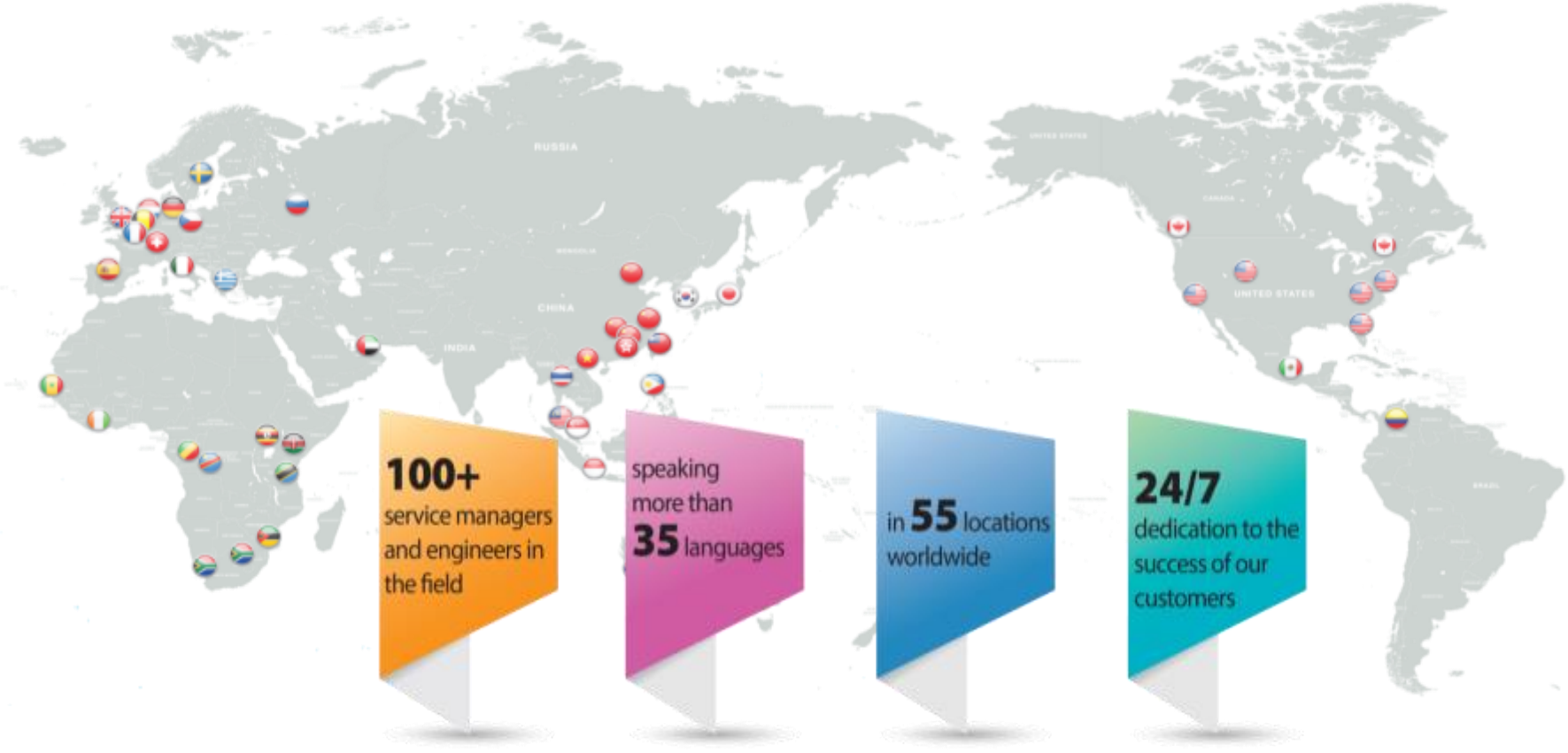
55 Offices Worldwide

Network Presence in over **3,000** Cities and **150** Countries

Global Connectivity – Fibre Network



Our Global Presence

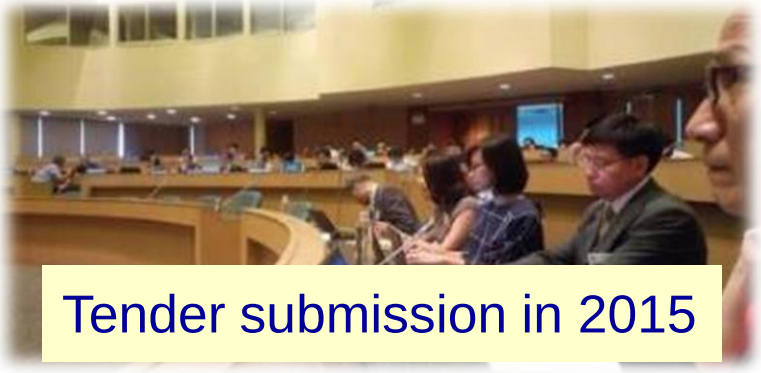


We Serve...

Fixed & Mobile Network Operators	Cloud and Application Providers	Internet Content Providers	Internet Service Providers	Enterprises / NGOs / Governments	Media & Broadcast Companies

Our Journey to CRV

ICAO Initiatives



Tender submission in 2015

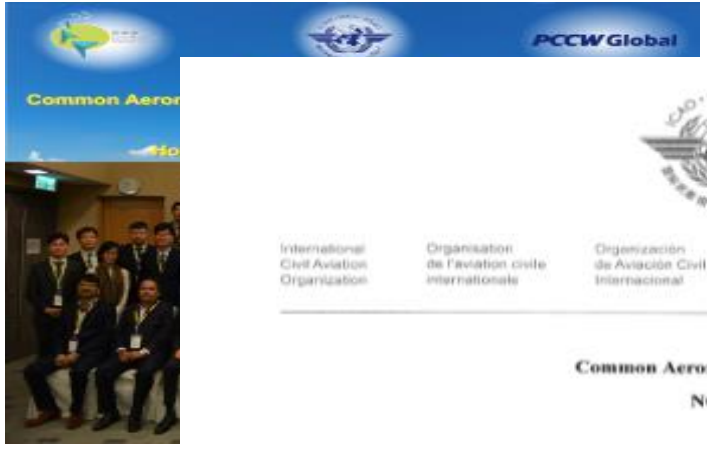
Rank 1 Provider in 2017

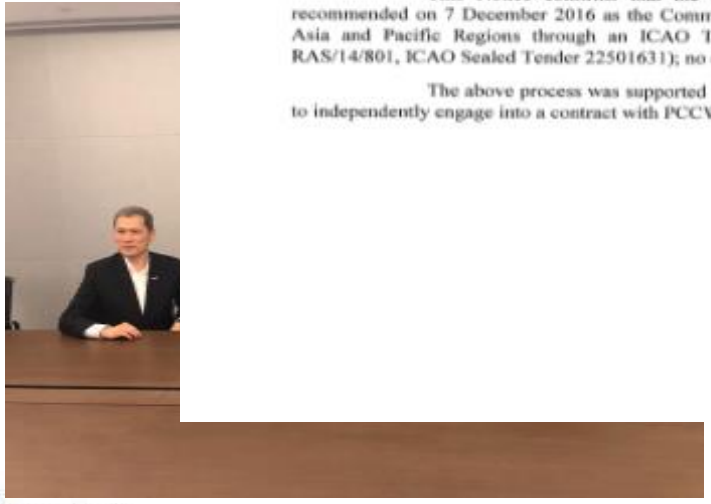
ICAO Initiatives

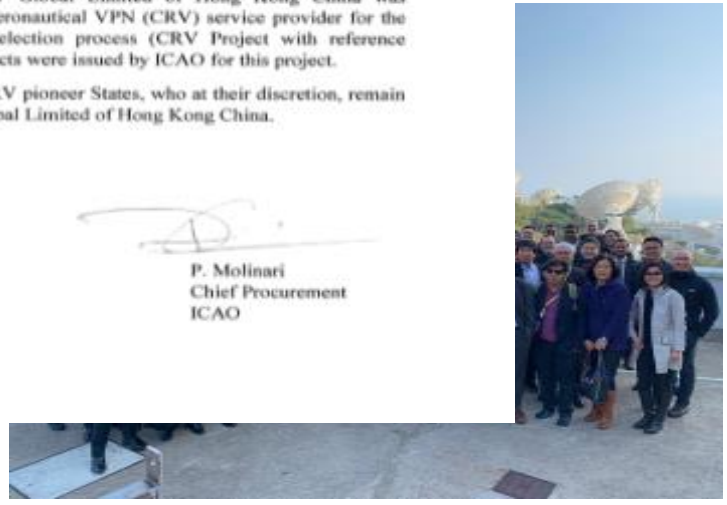
PCCW Global officially became exclusive Certified CRV Service Provider for Asia Pacific

Signing ceremony at Bangkok on 18th Dec 2017 in ICAO Asia pacific Office

Feb 19 CRV/OG5 Meeting (Pilot Test Approval Signing Ceremony)







International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Common Aeronautical VPN (CRV)

NOTICE

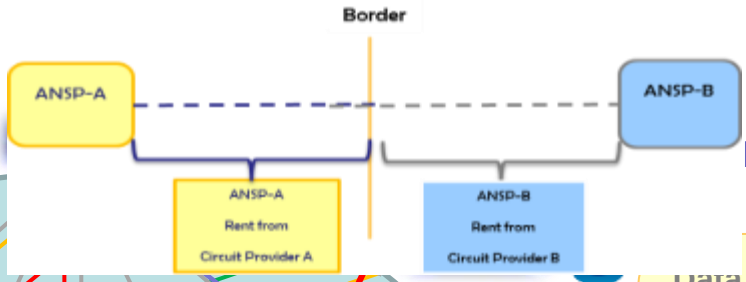
This Notice confirms that the PCCW Global Limited of Hong Kong China was recommended on 7 December 2016 as the Common Aeronautical VPN (CRV) service provider for the Asia and Pacific Regions through an ICAO TCB selection process (CRV Project with reference RAS/14/801, ICAO Sealed Tender 22501631); no contracts were issued by ICAO for this project.

The above process was supported by CRV pioneer States, who at their discretion, remain to independently engage into a contract with PCCW Global Limited of Hong Kong China.

P. Molinari
Chief Procurement
ICAO

Why CRV ?

Traditional infrastructure



ANSP-C

P-D

ANSP-B

ANSP-A

ANSP-E

ANSP-H……Z

ANSP-G

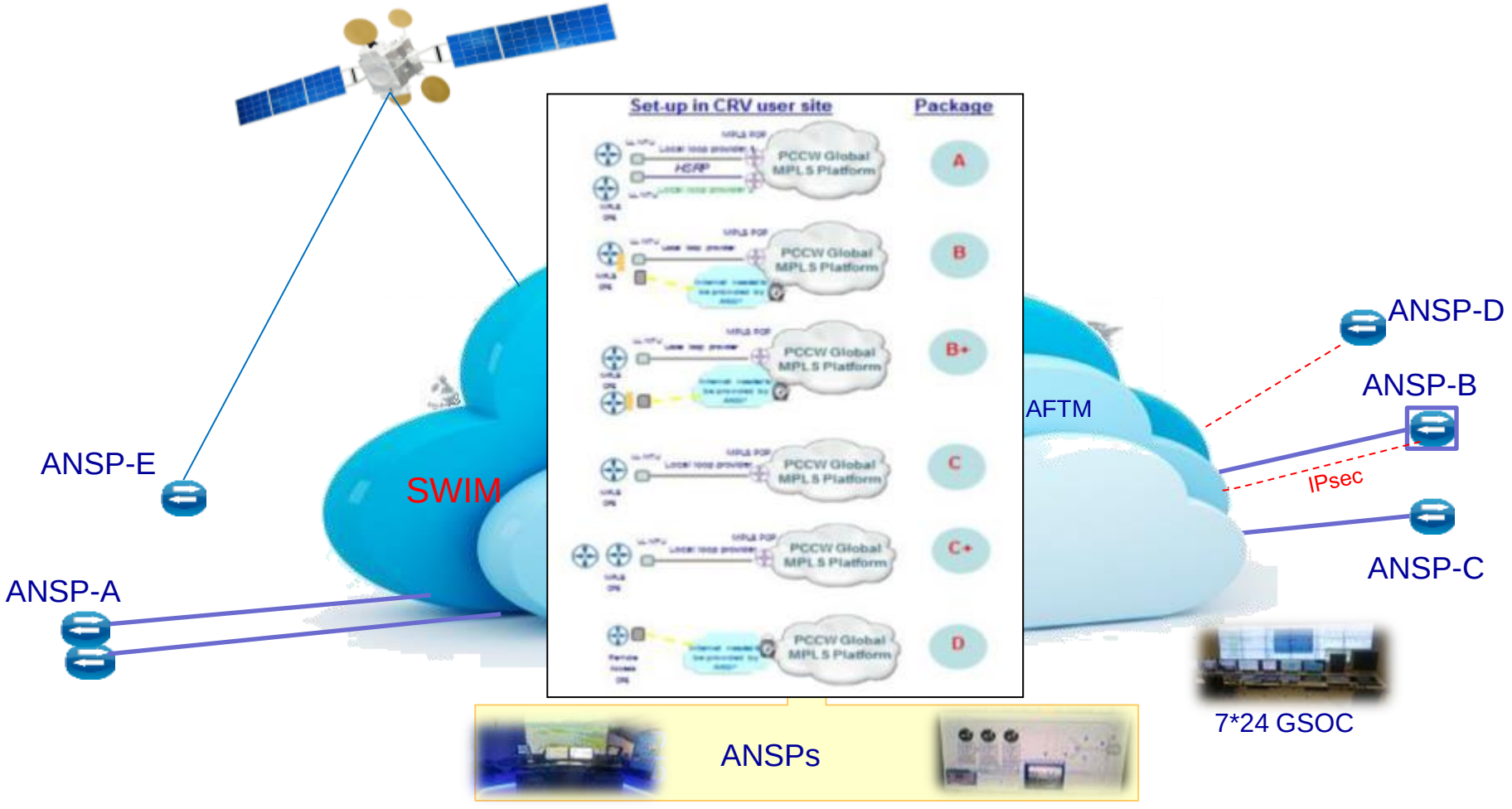
Current Limitations:

- Long time for circuit agreement
- Experience different level of technical support service from circuit provider
- More resources required from ANSP for monitoring the service
- No dynamic routing, service level is affected
- Hard to perform technical upgrade and introducing new features

Data
AFTN, AMHS, ATS
Interfacility Data

Voice on 9.6k link
ground-to-ground voice communications

CRV: Asia Pacific/Middle East's aeronautical communications infrastructure



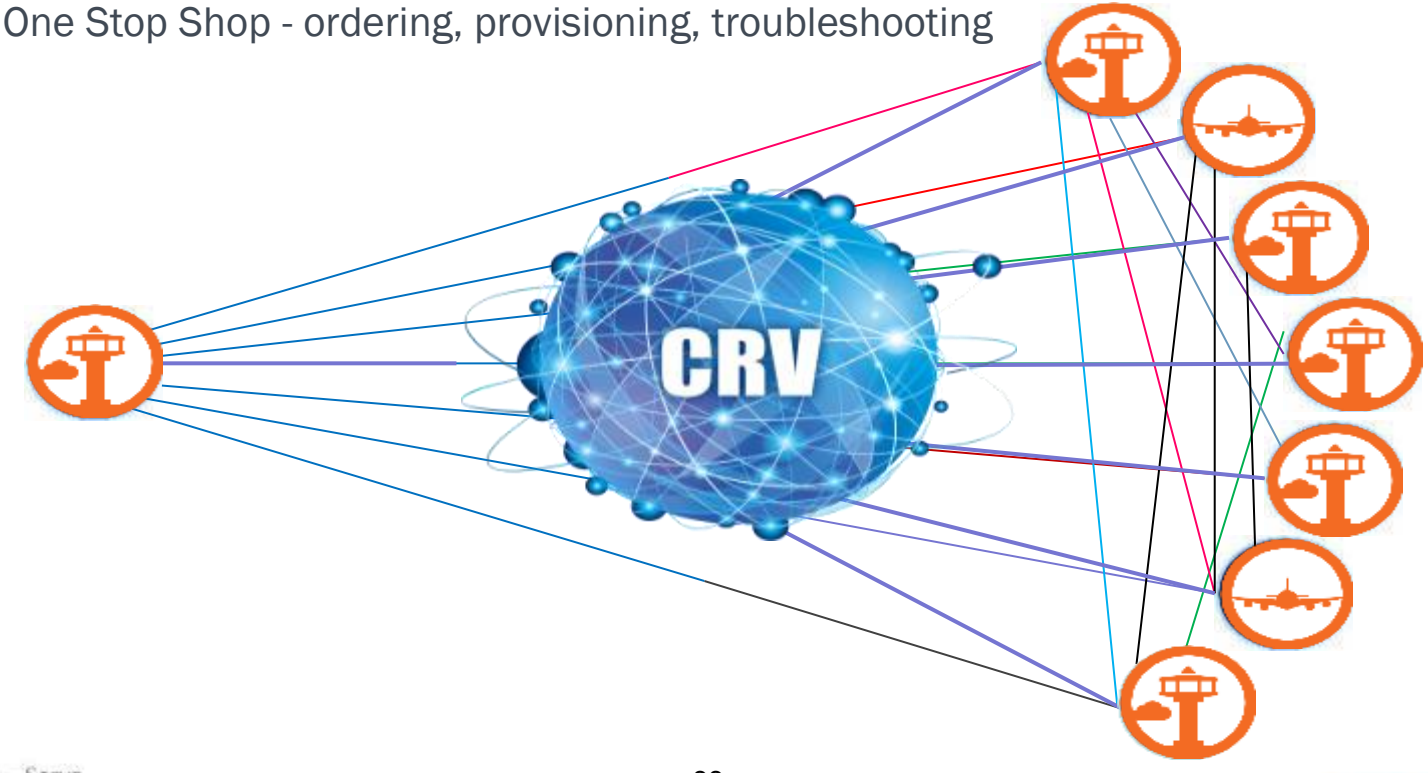
Characteristics and Benefits

Serve as the future Middle East/Asia Pacific aeronautical network for ANSP to exchange aviation data information and voice communication

Characteristics and Benefits

Simple

- One connection – avoids additional physical work in future
- IP based network – enables the flow of various aviation application and traffic
- One Stop Shop - ordering, provisioning, troubleshooting



Characteristics and benefits

Secure

- Closed private network – unreachable & invisible from Internet
- ISO 27001: Information Security Management

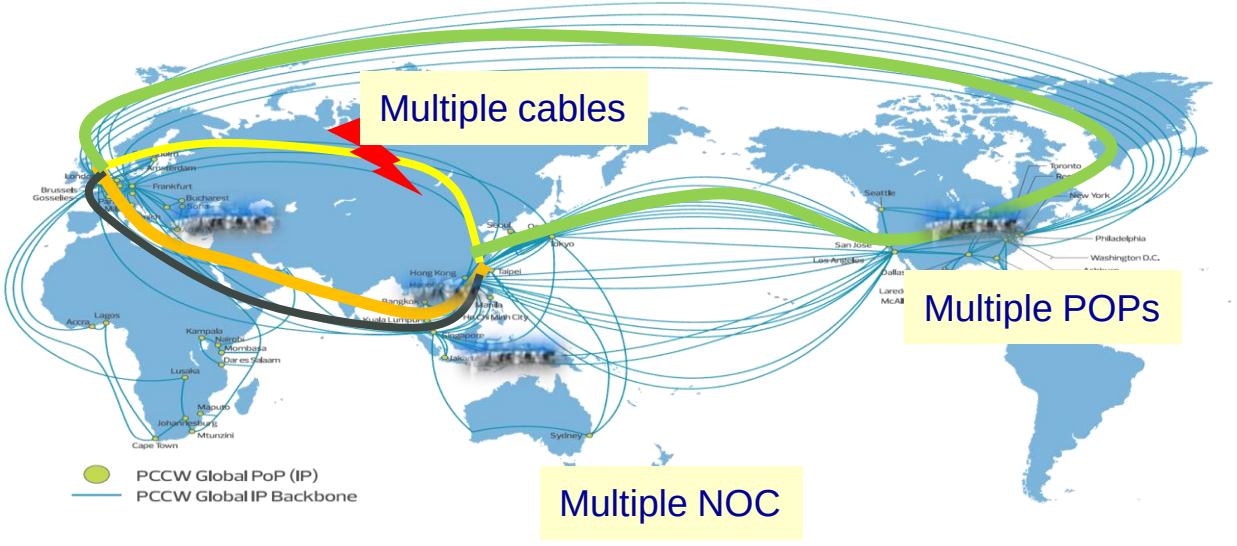
Private

Public

Characteristics and benefits

Safe

- Resilient network consists of multiple nodes and trunks riding on diverse cable systems
- Contingency plan to maintain high availability



Fully Managed

- Provides proactive monitoring on round-the-clock basis
- State users have full visibility and measurable of it's network health in the portal.

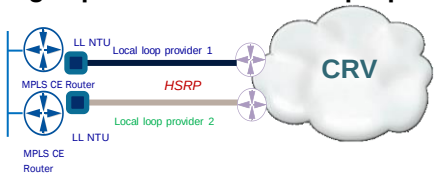
CRV, the network of tomorrow

CRV package and ordering

CRV connection packages

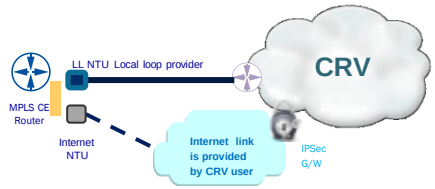
4 major packages plus 2 variations are proposed as below:

Package A

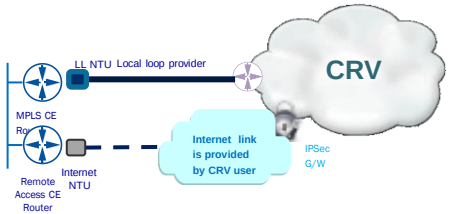


Package A – dual links and dual CE routers (NIDs) in active / standby operation mode will be installed at the CRV user site.

Package B



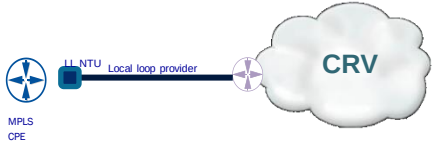
Package B+



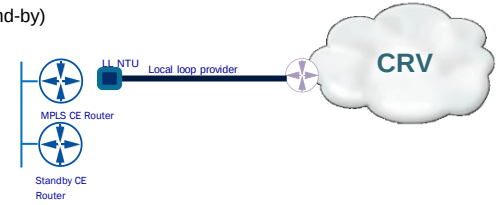
Package B – single link and single CE router (NID) will be installed at the CRV user site. In addition, PCCW Global will provide an IPSec port at MPLS IPSec gateway for back-up and CRV user will provide a dedicated Internet link for connection.

Package B+ – same as Package B but with one extra CE router (NID) for IPSec back-up link (stand-by)

Package C



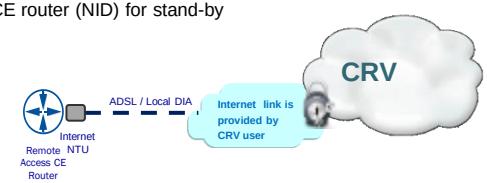
Package C+



Package C – single link and single CE router (NID) will be installed at the CRV user site.

Package C+ – same as Package C but with one extra CE router (NID) for stand-by

Package D



Package D – PCCW Global will provide an IPSec port at MPLS IPSec gateway and CRV user will provide a dedicated Internet link for connection.

PCCW Global

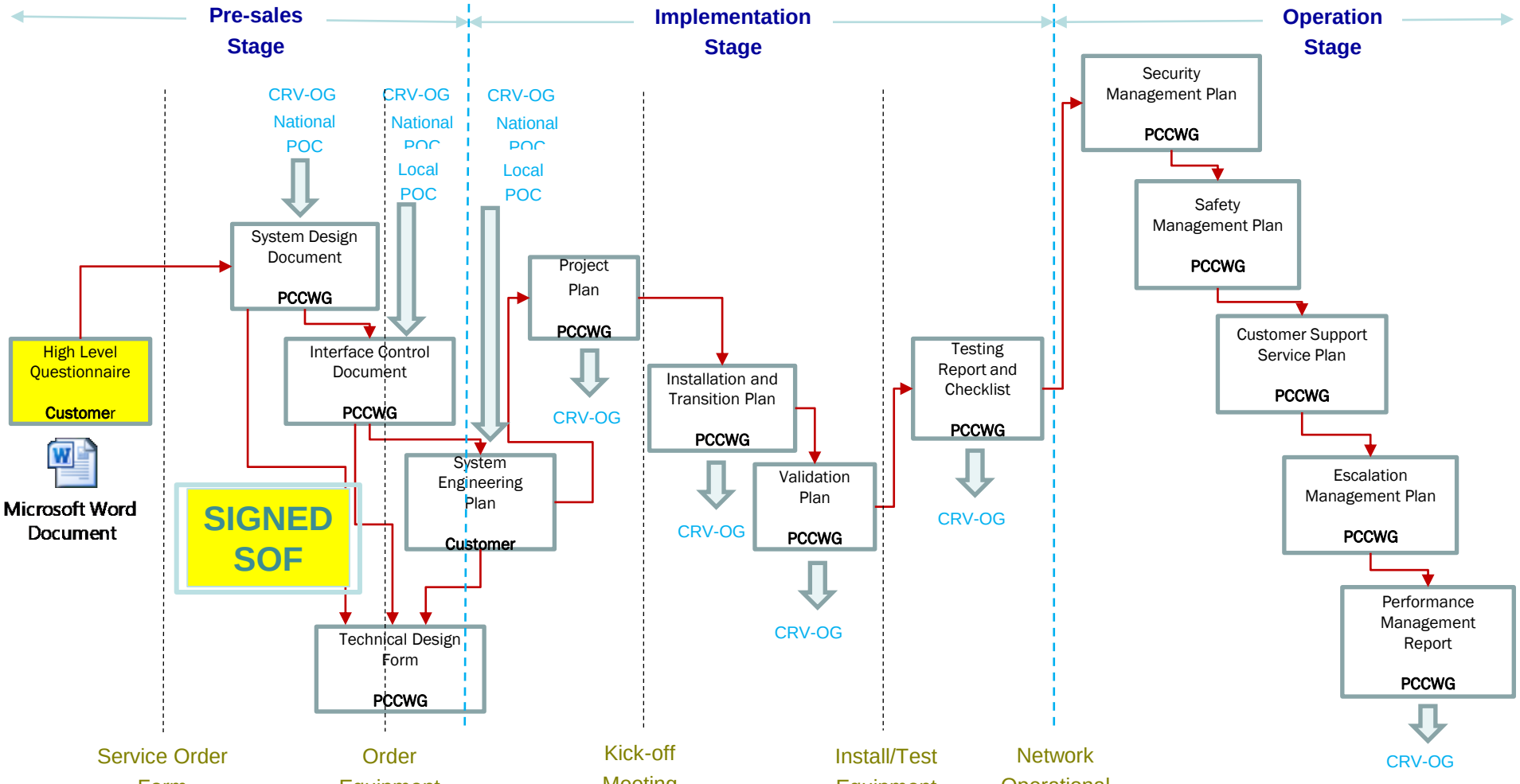
SLA Offering

Highest Availability

SLA Package	Package A		Package B		Package B+		Package C		Package C+		Package D	
Site Availability	99.97% (connectivity + router)		99.5% (connectivity+ router)		99.95% (connectivity+ router)		99.5% (connectivity+ router)		99.7 % (connectivity+ router)		99.5% (IPSec gateway port only)	
Site to Site Round Trip Delay by zone	200ms	600ms	200ms	600ms	200ms	600ms	200ms	600ms	200ms	600ms	PoP to PoP 200ms	PoP to PoP 600ms
Site to Site Packet Drop rate	<0.1% for Voice; <0.5% for Data		<0.1% for Voice; <0.5% for Data				<0.1% for Voice; <0.5% for Data				PoP to PoP <0.5% for Data	
Site to Site Jitter	15ms for Voice; 250ms for Data		15ms for Voice; 250ms for Data				15ms for Voice; 250ms for Data				250ms for Data (PoP to PoP)	
Rebate	Yes		Yes				Yes				No	

Recommended Package for CRV users
Package A or Package B+

High Level Work Flow



CRV scope and provisioning status Updates

Scope and Potential members of
Common aeRonautical Virtual Private Network (CRV)

ANSP – 50+ (APAC & MID)

ATM Community

CRV Status under operation and provisioning

9 states in 14 cities

Scope and Potential members of
Common aeRonautical Virtual Private Network (CRV)

ANSP – 50+ (APAC & MID)

ATM Community

Regional Capabilities
in Middle East

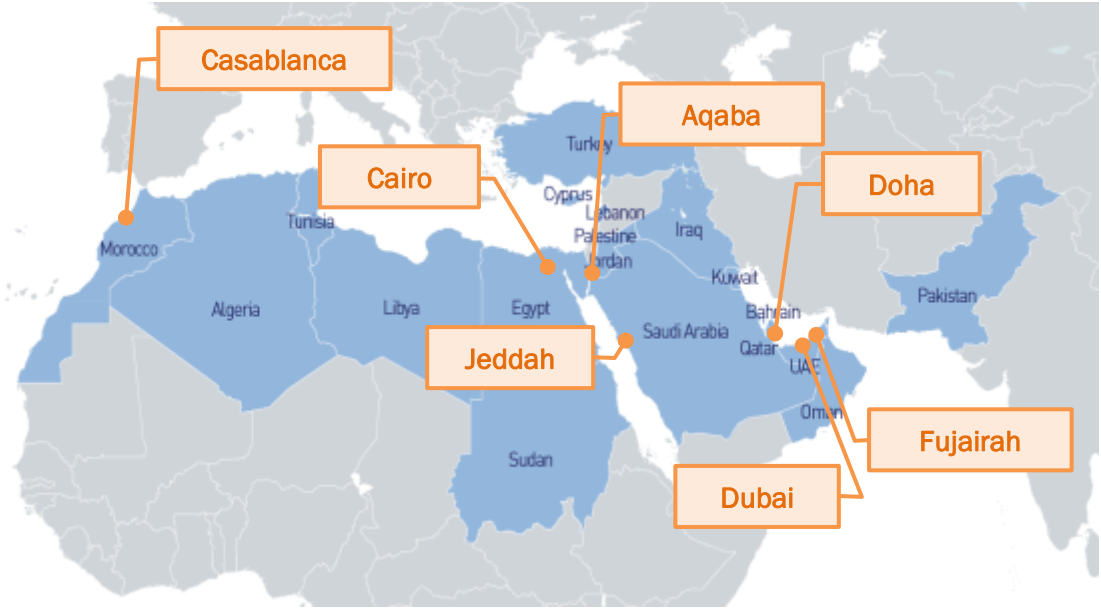
Staff Presence in MENA

The Telecoms World Awards Middle East

- Strategic alliance agreements and strong relationships with regional leading carriers
- Widespread coverage across the region with diverse connections from Gulf Region to Asia and Europe
- Awarded with Best International Wholesale Carrier Telecoms World Middle East consecutively from 2011 to 2017

Service Coverage in MENA

Area	Middle East		Northern Africa
Countries	16		6
	Afghanistan	Saudi Arabia	Algeria
	Bahrain	Turkey	Egypt
	Cyprus	UAE	Libya (Tripoli only)
	Iran		Morocco
	Iraq		Tunisia
	Israel		Sudan
	Jordan		
	Kuwait		
	Lebanon		
	Oman		
	Pakistan		
	Palestine		
	Qatar		

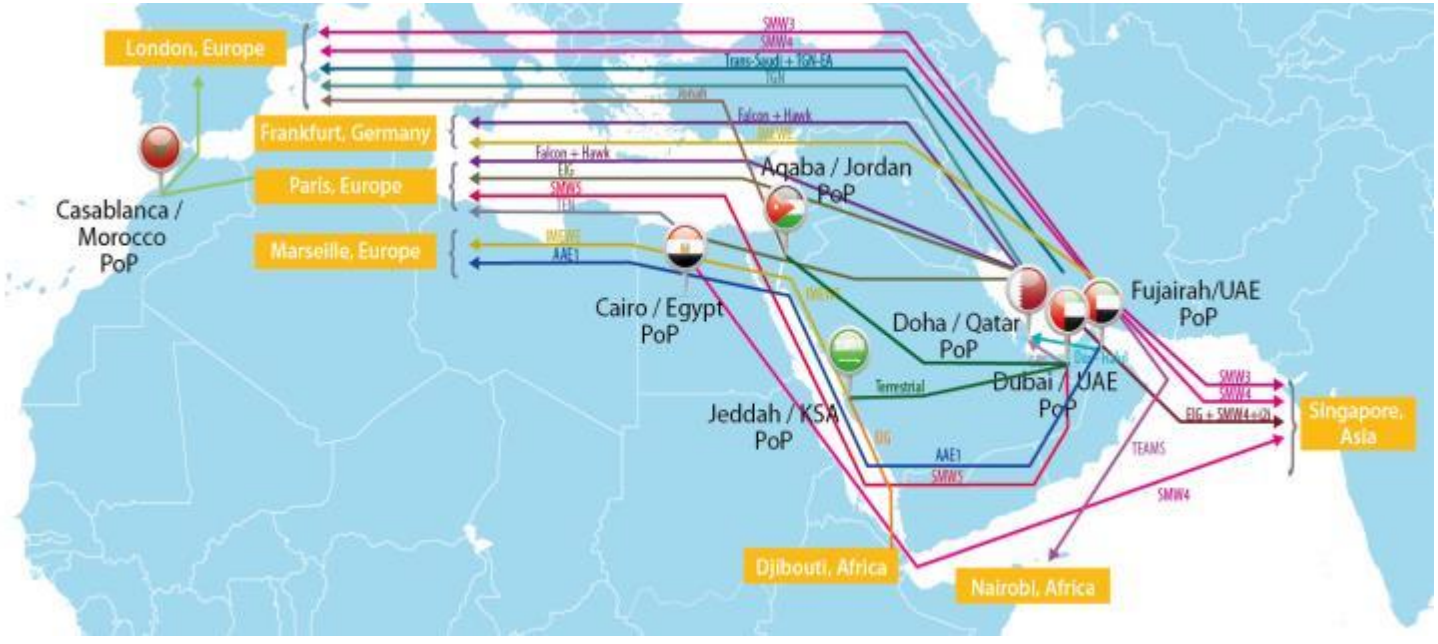


22 Middle East and North African countries

With On-Net PoPs in **6** countries

34 Partnerships for inter-region connections

On-net Infrastructure in MENA



Unique features

Dubai/UAE PoP

① Regional Hub for GCC
② Key platform for ICI with regional player
③ Key focus on low latency route

Fujairah/UAE PoP

① Gateway between Asia and Africa
② Key PoP for enterprise in UAE

Doha/Qatar PoP

① Target for financial segment
② Transit gateway for UAE traffic

Jeddah/KSA PoP

① Regional sub-sea cables hub
② Strategic PoP to connect Gulf, East Africa and Europe

Cairo/Egypt PoP

① Regional Hub for N Africa
② Carry regional video traffic to major Satellite teleport such as NileSAT

Key Value ►

Regional Traffic (data + video) within MENA region + High availability + *Africa connection*

Better performance

Key Service Portfolio for PoPs in Middle East

Item	Country	Number of PoPs (TX, IP/MPLS)	IP Solutions		Global Ethernet Solutions			Fiber Solutions	GTVN & Satellite
			GIA/IP Transit	MPLS VPN	VPLS	Switched Ethernet	Dedicated Ethernet	IPLC	GTVN
1	UAE	6	✔	✔	✔	✔	✔	✔	✔
2	Saudi Arabia	2	✔	✔	✔	✔	✔	✔	
3	Qatar	2	✔	✔	✔	✔	✔	✔	
4	Jordan	2		✔	✔	✔	✔	✔	

Note: TX POPs cover IPLC/IEPL POPs

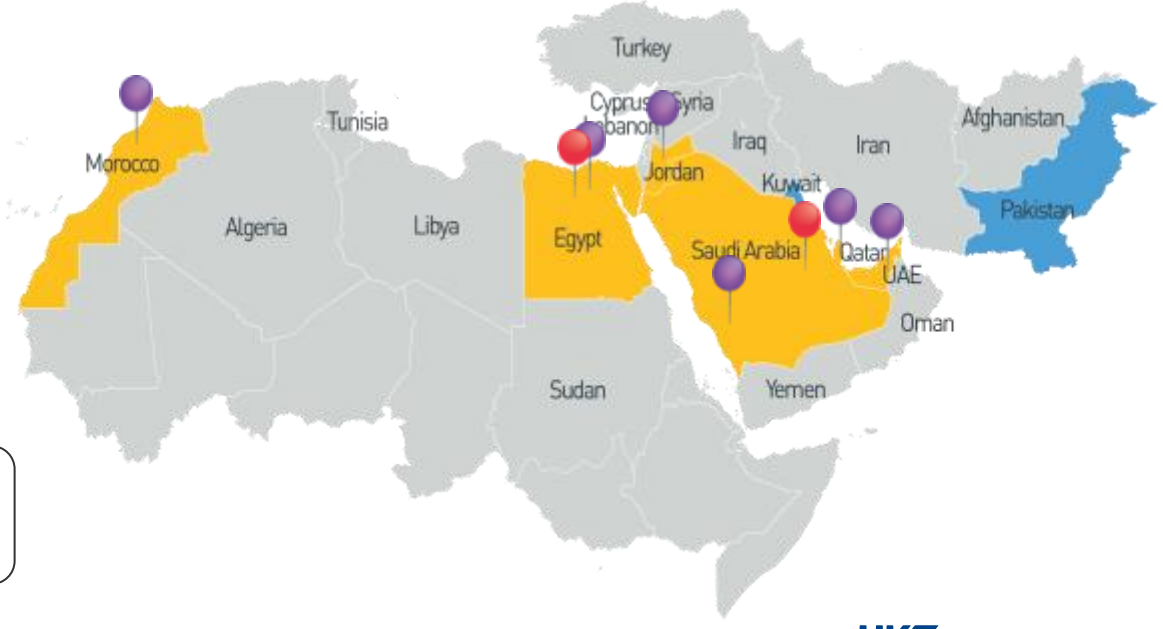
Development Plan in MENA

Expansion 2020

- ✓Saudi Arabia (new city Riyadh)
- ✓Egypt Cairo (second POP)

Planning 2020

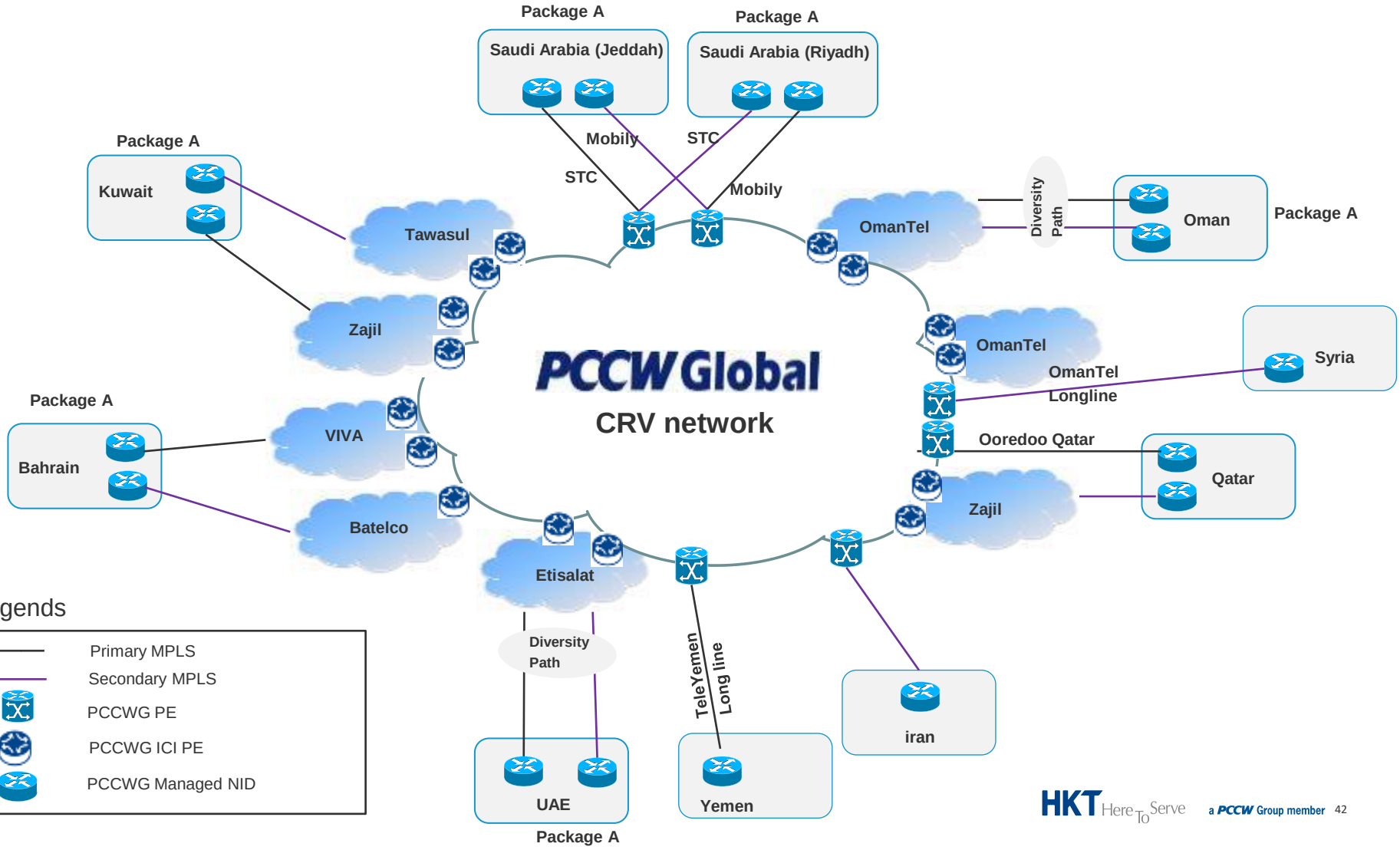
- ✓Kuwait
- ✓Pakistan



- Countries with on-net PoP
- Countries under 2019 Plan
- Countries under 2020 Plan

Proposed Solution for CRV

ICAO (MID Region) - Proposed Network Diagram



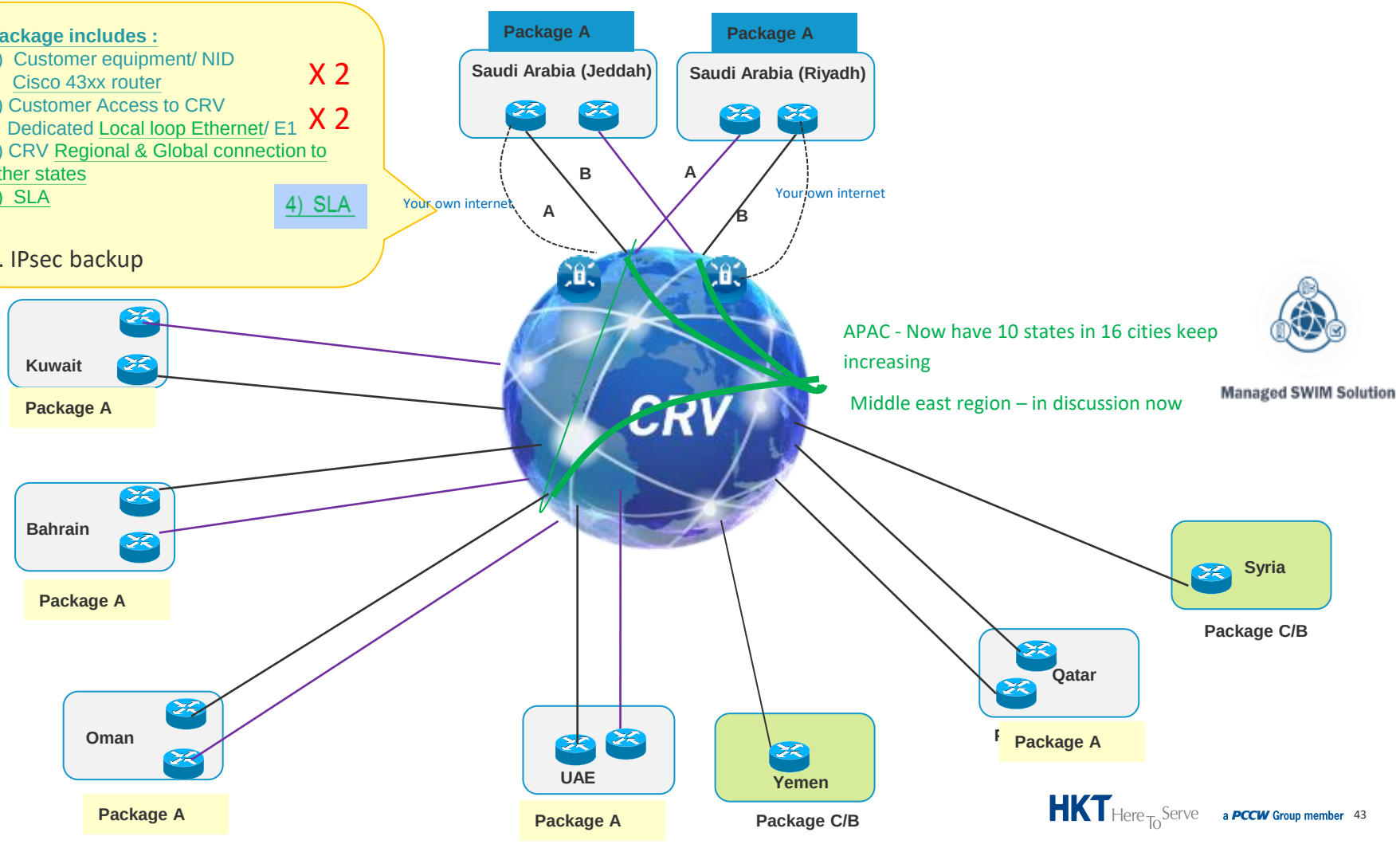
Legends

- Primary MPLS
- Secondary MPLS
- PCCWG PE
- PCCWG ICI PE
- PCCWG Managed NID

Package includes :

1) Customer equipment/ NID
   Cisco 43xx router X 2
2) Customer Access to CRV
   Dedicated Local loop Ethernet/ E1 X 2
3) CRV Regional & Global connection to other states
4) SLA

5. IPsec backup



APAC - Now have 10 states in 16 cities keep increasing

Middle east region – in discussion now

Managed SWIM Solution

Q & A

Thank you

Regional Contacts

Africa
Johannesburg, South Africa
Tel: +27 11797 3300
Email: africa@pccwglobal.com

Americas
Virginia, United States
Tel: +1 703 621 1600
Email: americas@pccwglobal.com

Asia & CIS
Hong Kong
Tel: +852 2888 6688
Email: asia-cis@pccwglobal.com

Europe
London, UK
Tel: +44 (0)207 173 1700
Email: europe@pccwglobal.com

Paris, France
Tel: +33 (0)1 42 66 08 35
Email: europe@pccwglobal.com

MENA
Dubai, United Arab Emirates
Tel: +971 (0) 4 446 7480
Email: mena@pccwglobal.com

Contact

Bowie Lam
Sales Manager
20th Floor, Telecom House
3 Gloucester Road, Wanchai, Hong Kong
T +852 2883 8905 M +852 63810415
bowiel@pccwglobal.com