Common IP-Based Network : CRV

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- **Background on IP-based networks**
  - MPLS Concept
  - Use of VSAT/terrestrial IP network in MPLS
  - QoS and Security
- **CRV Development**
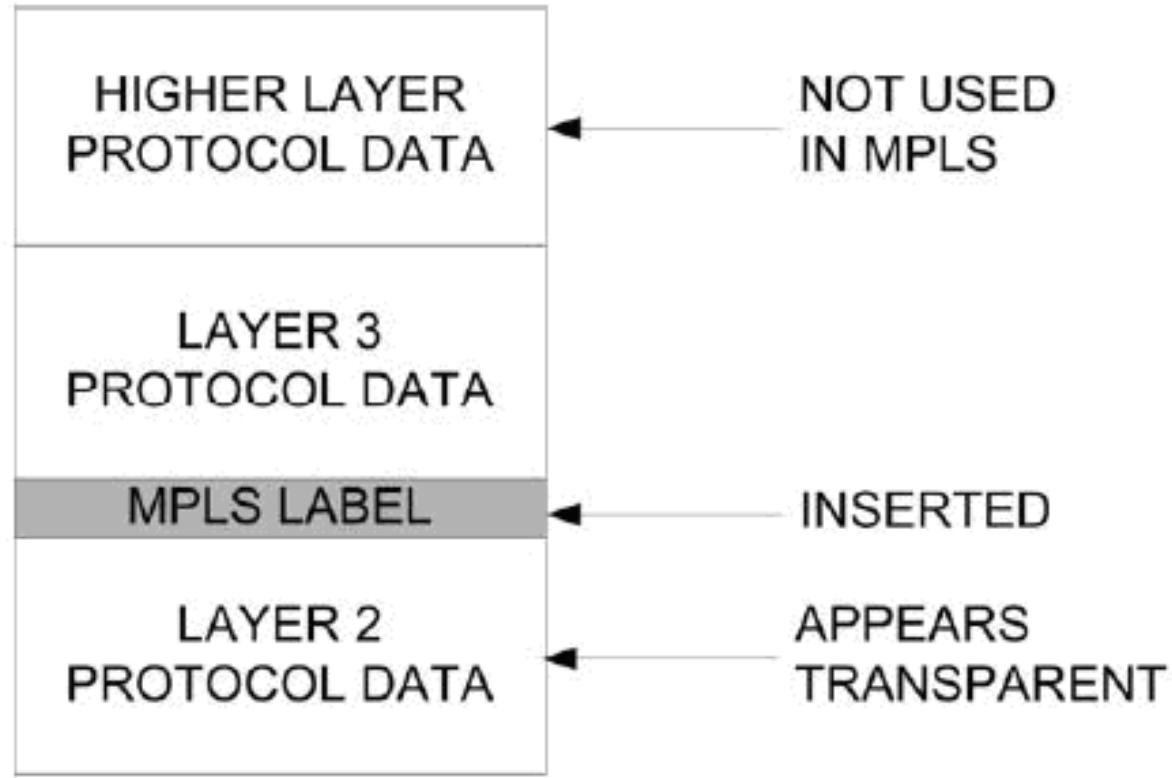 - What?
  - Why?
  - How?

- **Multiprotocol Label Switching (MPLS)**
- **Scalable and manageable IP VPN network.**
- **Use 'label' attached to IP packets to route packets through the provider's network.**
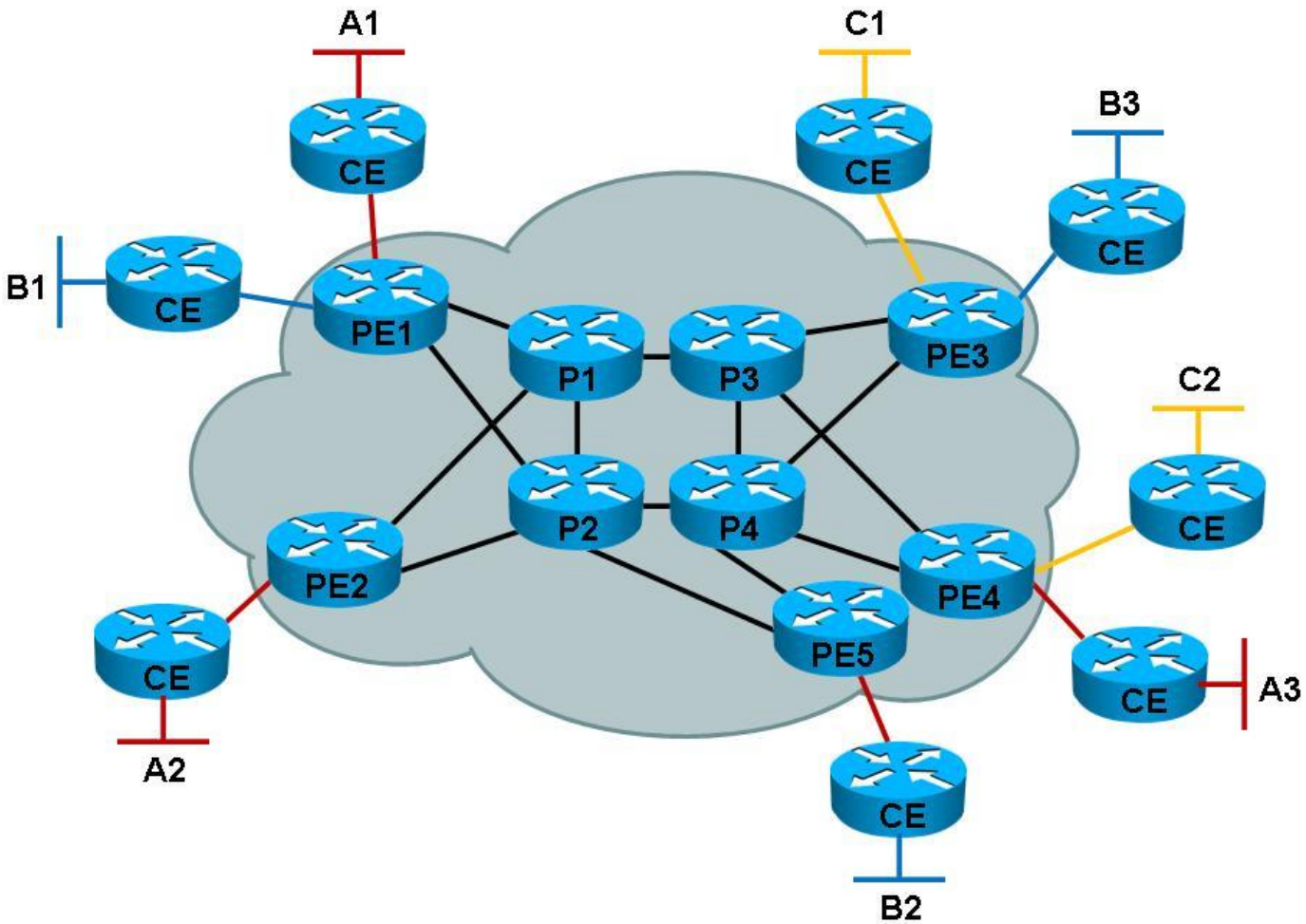
Background – MPLS Concept

HIGHER LAYER PROTOCOL DATA	NOT USED IN MPLS
LAYER 3 PROTOCOL DATA	
MPLS LABEL	INSERTED
LAYER 2 PROTOCOL DATA	APPEARS TRANSPARENT

Components

- Customer-Edge (CE) router – routers located at the facility of customer.

- Provider-Edge (PE) router – provider's 1st router that connects to the CE router.

- Provider router (P) – label switch routers internal to provider.

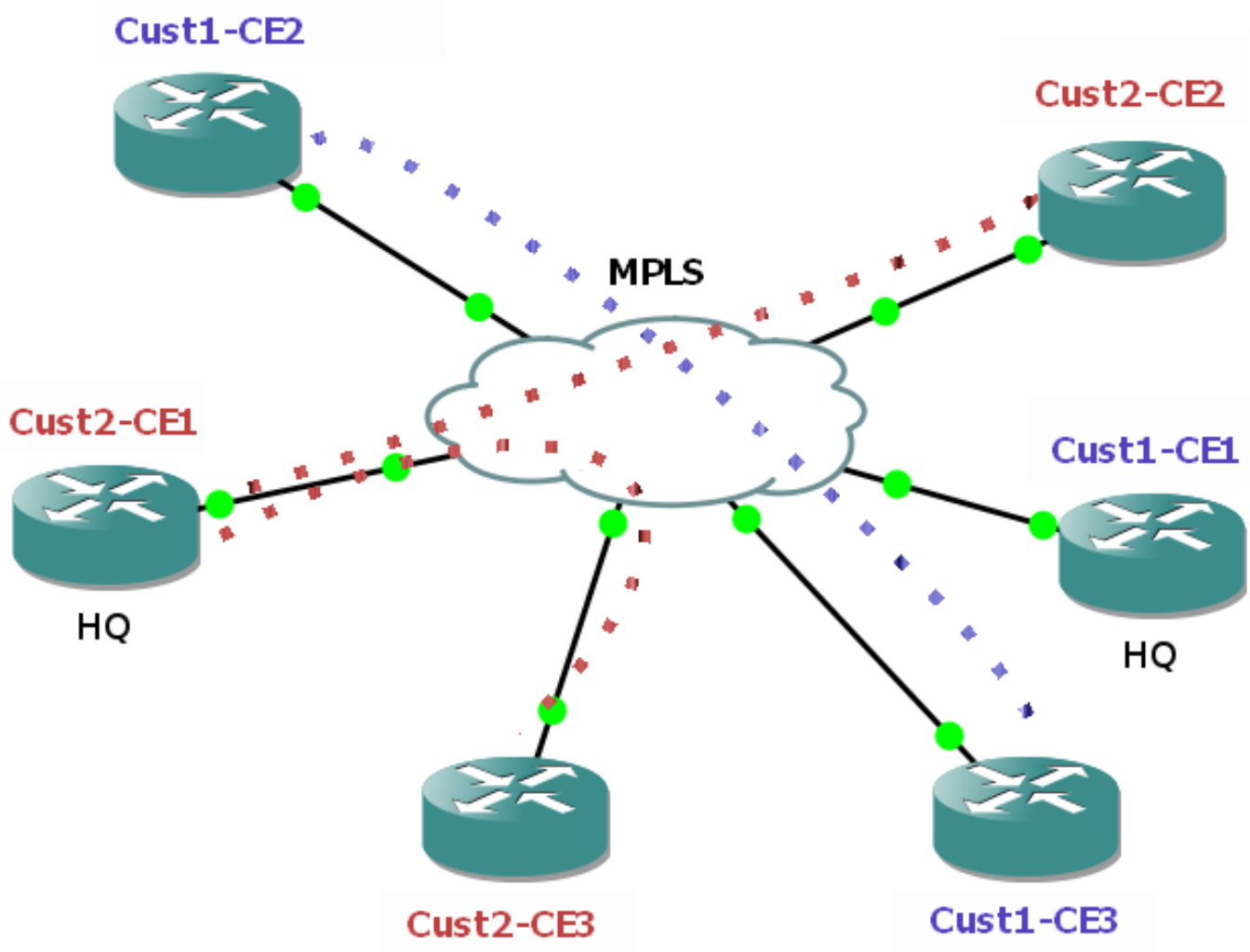- **MPLS provides pseudo-wire (VPN tunnel) connectivity between end systems.**

- **Can support multiple applications such as voice (VoIP), data communication with different QoS, etc.**

Background – MPLS Concept

- **MPLS can be used over VSAT and traditional terrestrial IP networks. They are treated as data link network layer.**

- **Different usage requirements provide parameters (bandwidth, latency, etc.) to configure the use of different networks under MPLS.**

  - Voice via VoIP

  - Different classes of data communication, e.g. high-priority, low-priority, etc.

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- **Depend upon the geographical requirements, one technology may perform better than the other.**
  - Islands / Mountainous area – maybe VSAT / Terrestrial IP (if available)
  - Large cities / flat terrain – maybe terrestrial IP / VSAT (as backups)

- **MPLS 'label' can provide QoS information.**

- **IP QoS parameters (DiffServ) can be mapped to the 'Label' QoS levels.**

- **Different applications are then mapped to the available IP DiffServ classes.**
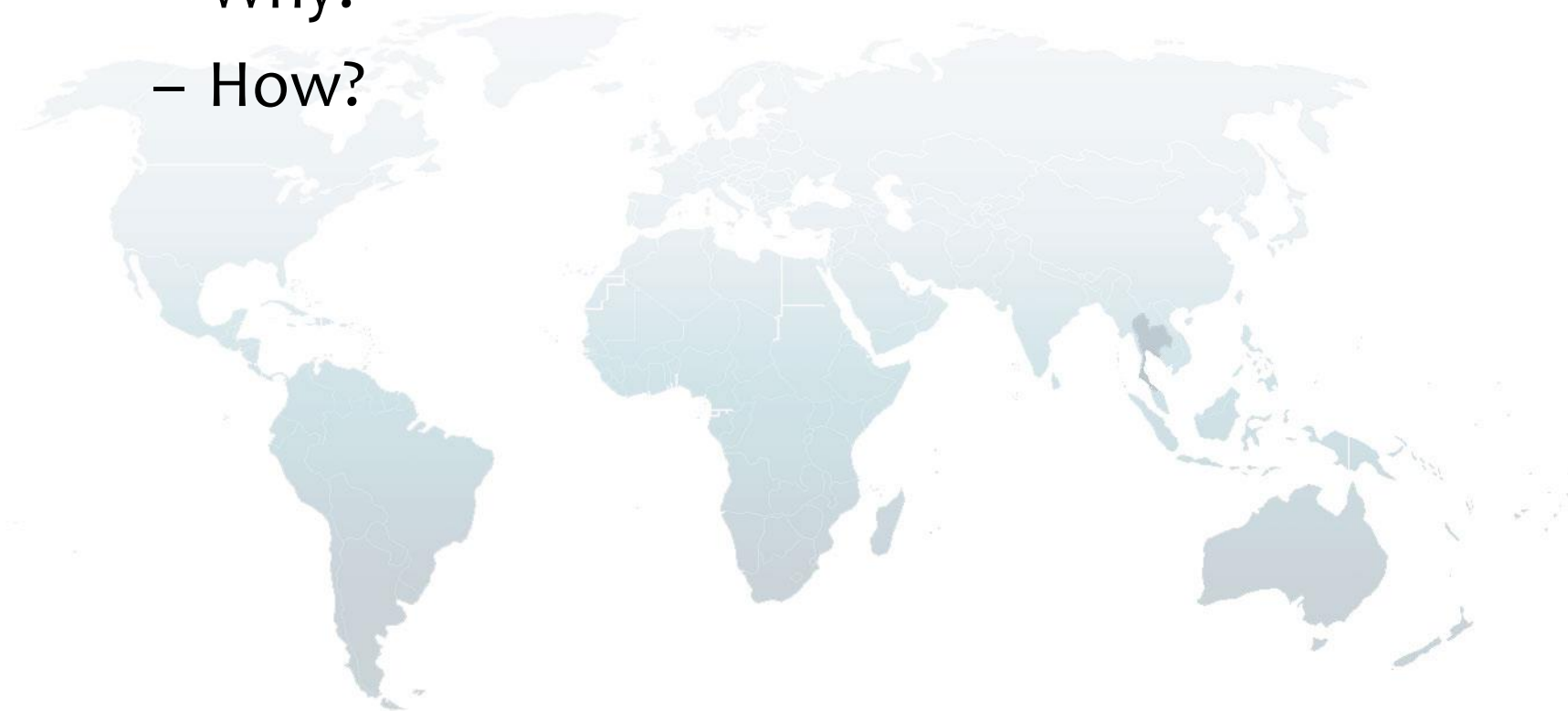
- **MPLS Security is result from the nature of private network of MPLS. (The 'pseudo-wire' property of connection)**

- **The network core will be secured by the provider.**

- **Encryption can be performed on the end-to-end systems to enhance security.**

- **CRV Development**
  - What?
  - Why?
  - How?

- **CRV, the "Common Regional Virtual private network"**

- **A wholly dependable and reliable communications infrastructure for aeronautical communications enabling the GANP roadmap**

- **a task force**
  - created end 2013 under decision 24/32 of APANPIRG

- **a programme**
  - conducted by the Task Force,
  - programme management principles
  - risk management.

- **an aeronautical service, part of Aeronautical Fixed Services (AFS)**
  - will expectedly become a safe and secured IP-based transportation service offered to CRV users from 2017 onwards through a common contractual framework
- **a common contractual framework**
  - will be established in 2016 if the ongoing Sealed Tender process successfully selects a best and final offer.
  - CRV Users are expected to establish individual contracts based on the common provisions.
  - The ongoing Sealed Tender process makes it possible for all MID States, and more users, to join the initiative
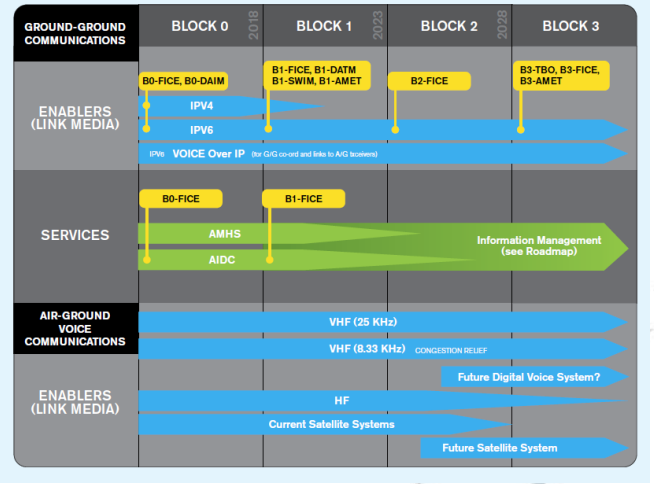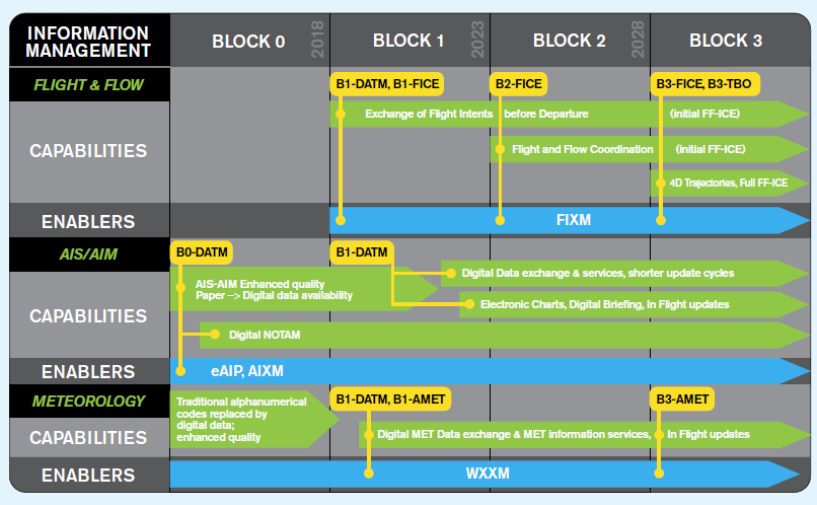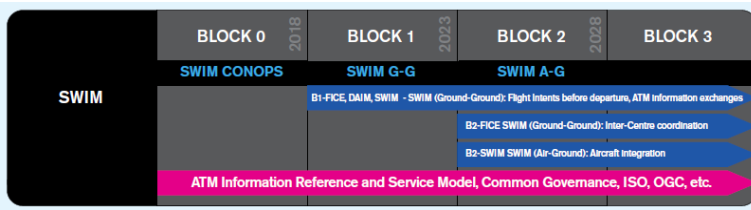
CRV Development – Why?

- **Follow ANC/12 Recommendation 1/6**

- **Support ATM Operational Concept as stated in ICAO Doc 9854 Global Air Traffic Management Operational Concept**

CRV Development – Why?

CRV Development – Why?

Enables

IPv4 / IPv6 interregional connectivity
Voice over IP
Directory / Security Services

…

B1-SWIM Performance Improvement through the Application of SWIM

…

B2-SWIM Enabling Airborne Participation in Collaborative ATM through SWIM

…

Etc.

CRV Development – Why?

Facilitates

B0-NOPS Improved Flow Performance through Planning based on a Network-wide view

B0-ASUR Initial Capability for Ground Surveillance

B0-FICE Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration

B1-RATS Remotely Operated Aerodrome Control

B1-FICE Increased Interoperability, Efficiency and Capacity through FF-ICE/1 application before Departure

B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)

B2-FICE Improved Coordination through Multi-centre Ground-Ground Integration (FF ICE, Step 1 and Flight Object, SWIM)

B3-FICE Improved Operational Performance through the Introduction of Full FF-ICE

B3-NOPS Traffic Complexity Management

C.R.V.

- **Single network infrastructure**
- **Support different types of communications based on requirements:**
  - QoS support
  - End-to-end performance
  - Enable different type of services such as time-sensitive information sharing (radar track), voice services (VoIP) or data services.
- **Support Security features**

CRV Development – Why?

- **Reduce telecommunication costs**
- **Enhance information security**
- **Support new enhancements (GANP, regional objectives)**
- **Provide a dynamic network**
- **Minimize coordination for network management and enhancement**
- **Respond to Air Traffic requirements in a timely manner**

CRV Development – Why?

- **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 and Caribbean has MEVA**

CRV Development – How?

- **Process**
- **Funding stage 1**
- **Funding stage 2**
- **Project management**
- **Tasks for individual states/administrations**
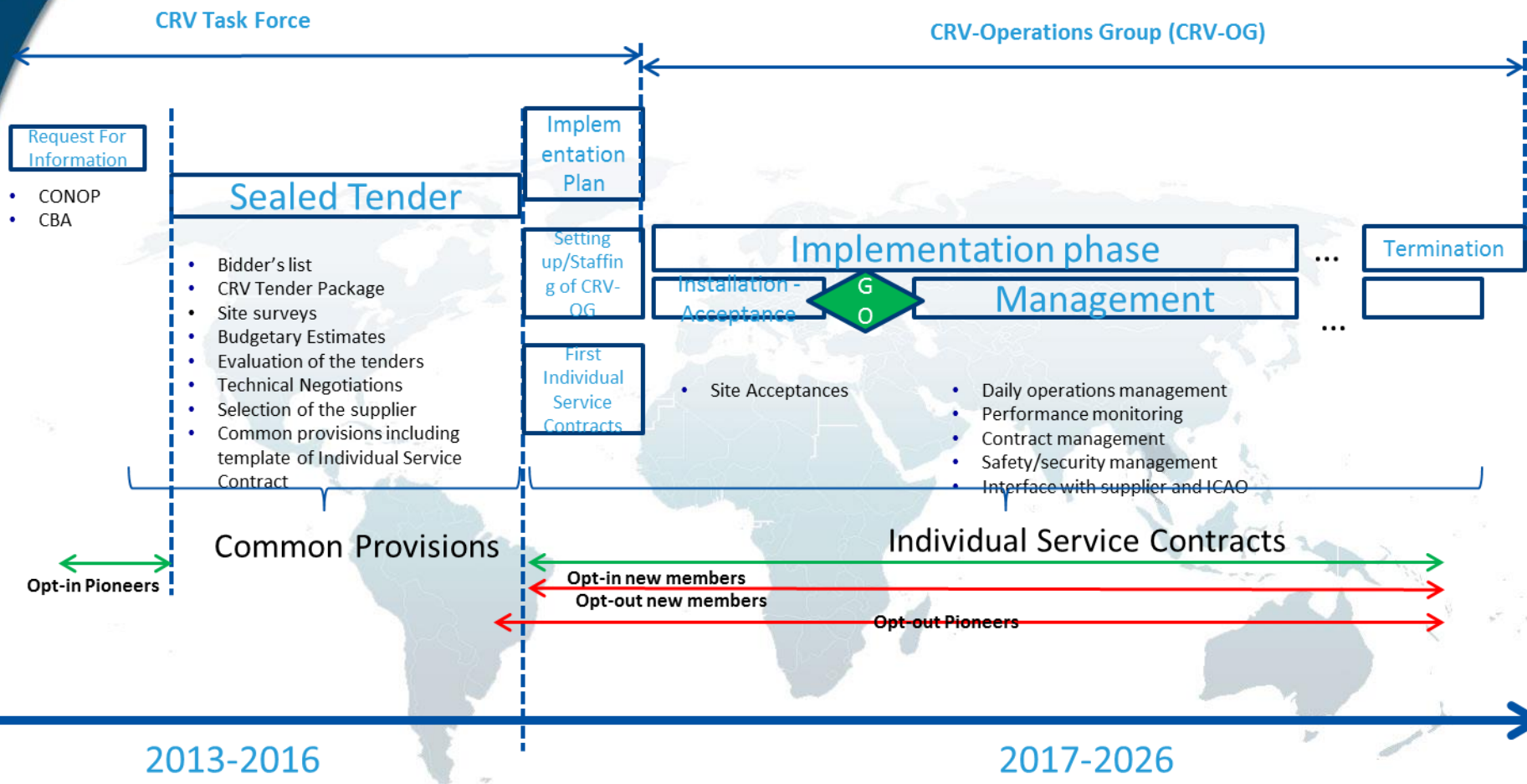
- **Stage 1: preparation**
  - definition of requirements
  - issuance of procurement
  - awarding of the contract
  - preparation of operations (plan, operational group, individual service contracts)
- **Stage 2: operations**

CRV Development – Process

CRV Development – Process

- **Roles of CRV OG**
  - Assistance with migration / implementation of CRV
  - Coordination and standardization of services and/or upgrade of services
  - Oversee the performance of the network
  - Escalation process of issues associate with provision of CRV
  - Etc.

- **Conclusion APANPIRG 25/34**
- **Pioneer States/Organizations shared the cost of conducting the Sealed Tender process on a cost-recovery basis**
  - ICAO TCB services = one part-time expert in Aeronautical communications and procurement
  - Estimate of the total cost was USD109,300
  - Equal share between States/Organizations
- **18 Pioneer States have joined by paying their contribution**

Funding Stage 2 Implementation

- **All States/Administrations 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
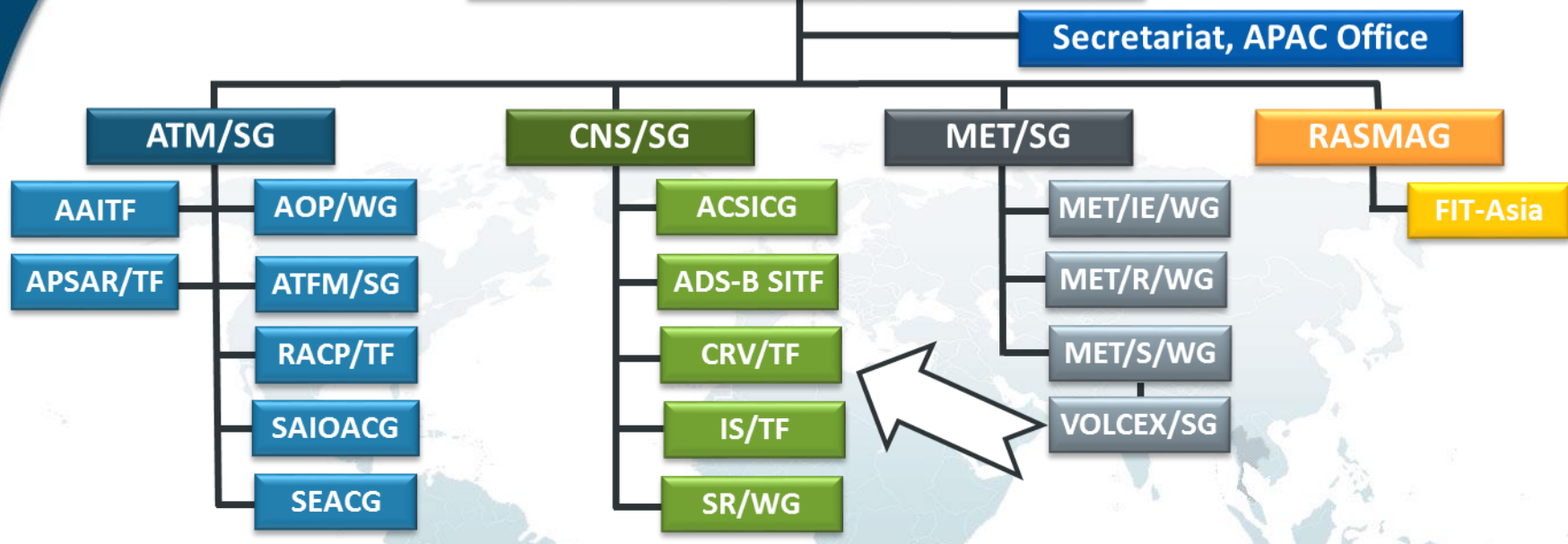 - No contract between ICAO and the supplier (general case)

- **The supplier could be a single provider / combination of Telecom. Service Providers**

- **No cost to pay with a local/national service provider, this is a END TO END service**

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ATM/SG	- ATM Sub Group	
AAITF	- AIS - AIM Implementation Task Force	
APSAR/TF	- APAC Search and Rescue Task Force	
AOP/WG	- Aerodrome Operations and Planning Working Group	
ATFM/SG	- ATFM Steering Group	
RACP/TF	- Regional ATM Contingency Plan Task Force	
SAIOACG	- South Asia Indian Ocean ATM Coordination Group	
SEACG	- South East Asia ATS Coordination Group	

CNS/SG	- CNS Sub Group
ACSICG	- Aeronautical Communication Services Implementation Coordination Group
ADS-B SITF	- ADS - B Study and Implementation Task Force
CRV/TF	- Common Regional Virtual Private Network (VPN) Task Force
IS/TF	- Ionospheric Studies Task Force
SR/WG	- Spectrum Review Working Group

MET/SG	- Meteorology Sub Group
MET/IE/WG	- Meteorological Information Exchange Working Group
MET/R/WG	- Meteorological Requirements Working Group
MET/S/WG	- Meteorological Services Working Group
RASMAG	- Regional Airspace Safety Monitoring Advisory Group
FIT-ASIA	- FANS Implementation Team - Asia

- **Local Cost Benefit Analysis (CBA)**
- **Local safety case**
- **Local implementation plan**

Questions and Comments