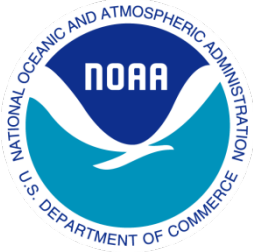




Robert Sears
NOAA/OCIO/SDD/N-Wave

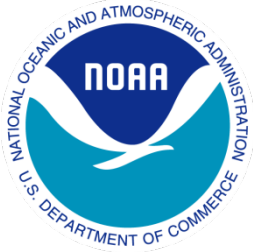


N-Wave Program



N-Wave is a program of Federal and contract staff that manage the NOAA Enterprise Network known as N-Wave, and also supports/aligns and executes on projects outlined in the NOAA Strategic Plan for Network Optimization and Transport Services.

Strategic plan: Deliver Enterprise Transport Services, Enhance NOAA's Network Security, Scale Network Capabilities, and Optimize Network Services.

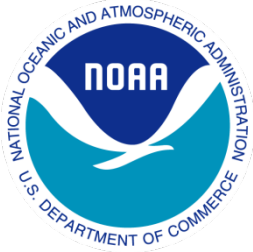


Mission



The N-Wave program is committed to providing innovative networking capabilities with integrity, transparency, and flexibility, to enable NOAA's missions through the implementation of:

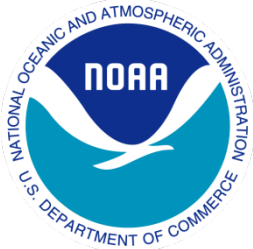
- Quality, advanced, stable connectivity both internally and externally to NOAA
- Secure, private, flexible, high-bandwidth virtual circuit capabilities
- Retention and recruitment of exceptional operations and engineering staff



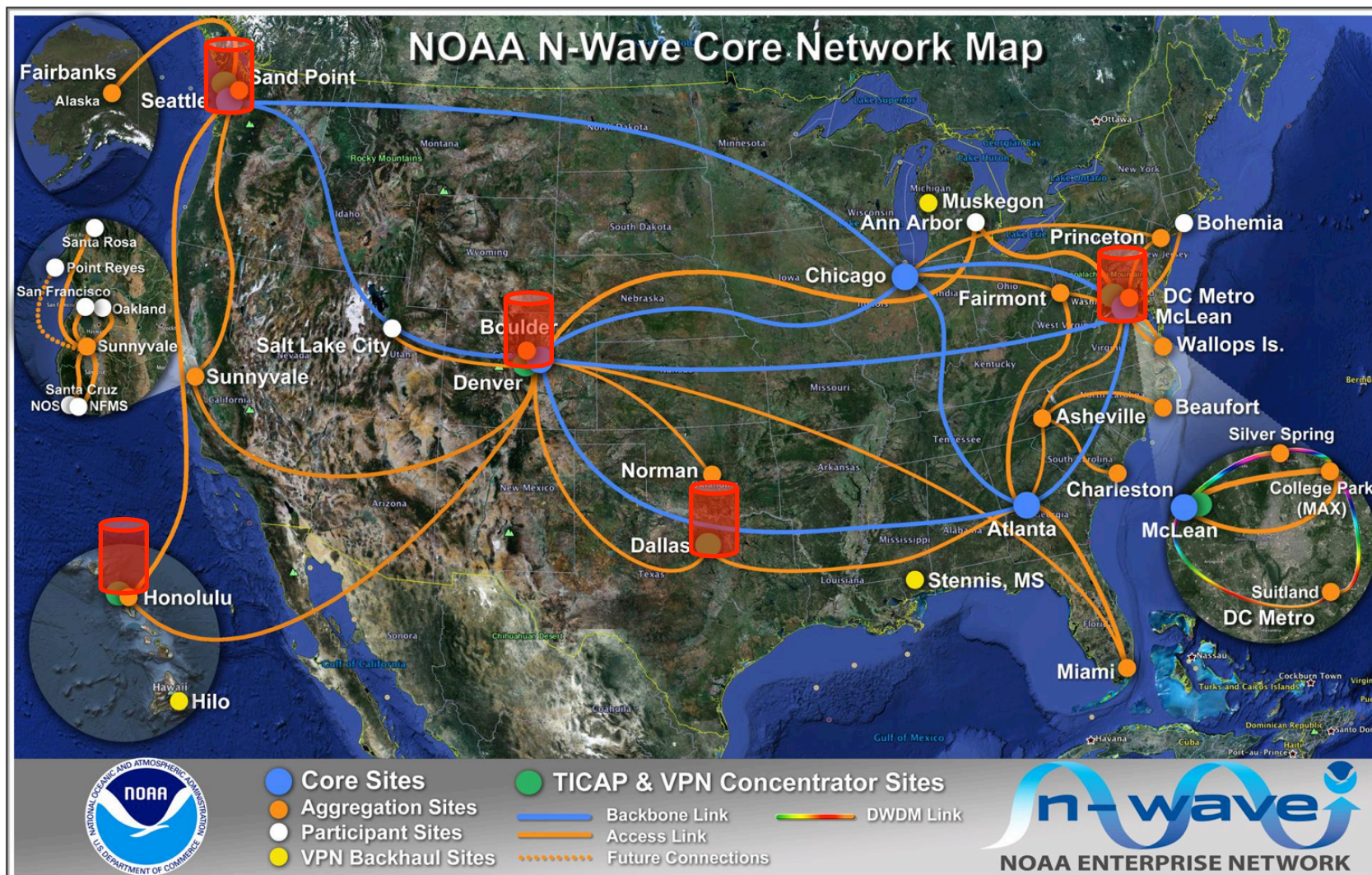
N-Wave the Network

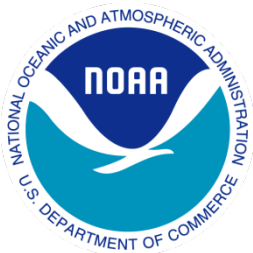


- N-Wave is an enterprise network that [supports operations and research](#) consisting of a private carrier class backbone that enables NOAA's mission of science, stewardship and service through highly available, high speed [networking services](#) delivered to NOAA customer sites, programs, line offices, and research facilities
- [Built on partnerships](#) and relationships among NOAA and the Academic and State scientific network communities
- As of 1 October 2015, managed and operated within the NOAA OCIO



NOAA TICAP Locations

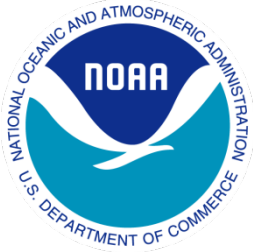




The I-TIC



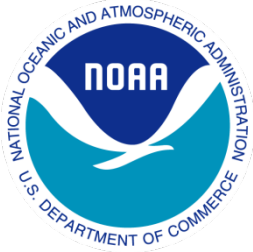
- Comprised of inline components.
- Directly processes inbound and outbound traffic.
- Firewalls.
- Services Ethernet switches.
- Web gateways.
- DNS resolvers.



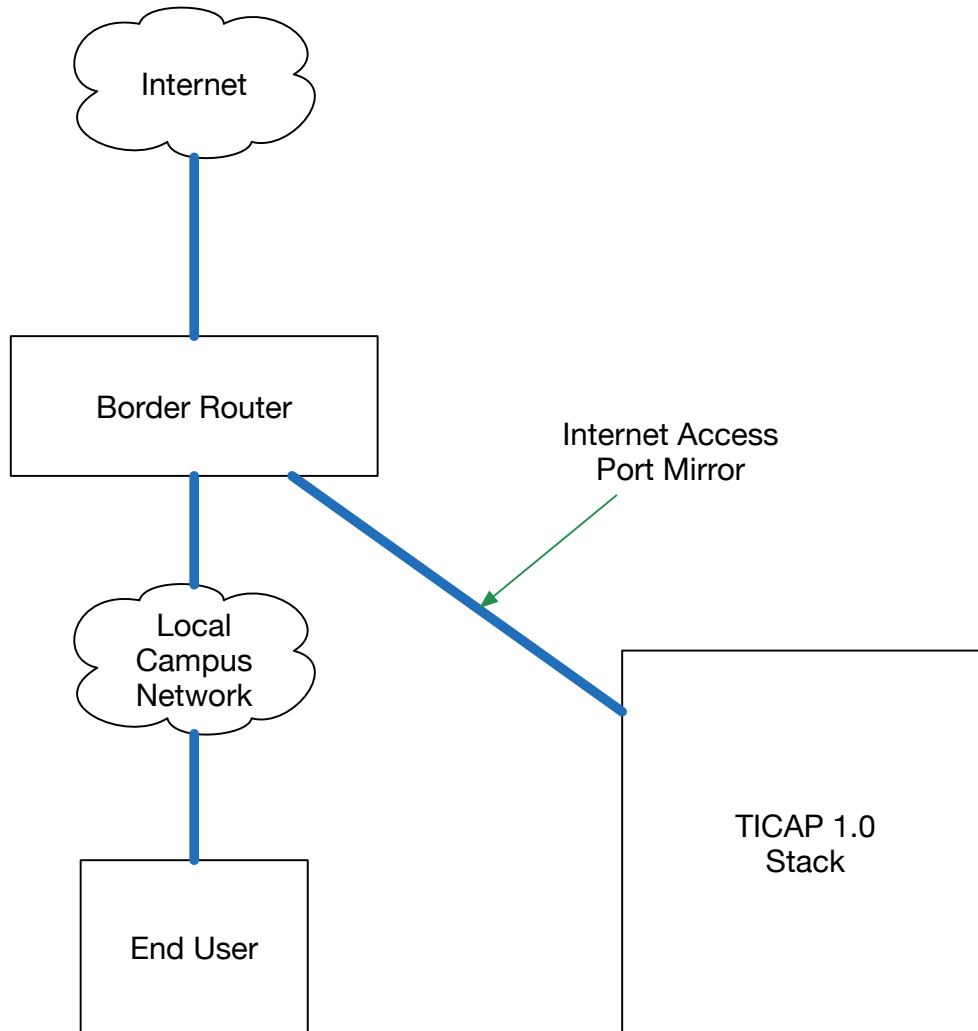
The O-TIC



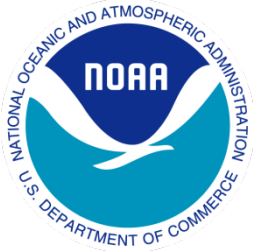
- Comprised of out of line components.
- Port mirrors on both aggregation routers feed to an active tap.
- The active tap distributes the traffic to the various security systems.
- All O-TIC systems are managed via dedicated network infrastructure that exists behind the TICAP management firewalls.
- The management firewalls have dedicated uplinks to N-Wave via the agg routers and reside inside the local tic virtual router. (e.g. pacific-tic)



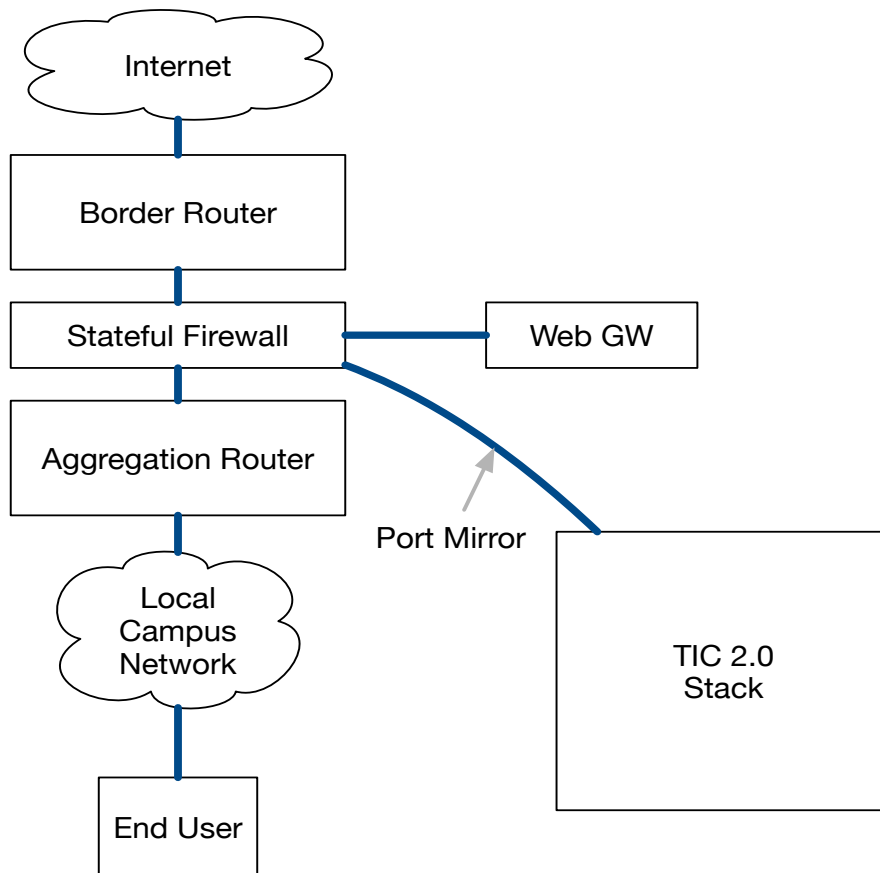
TICAP 1.0



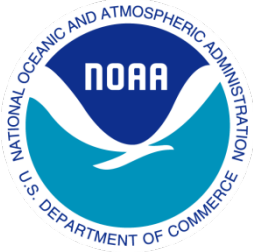
- Port mirror of egress/ingress traffic to security analysis systems.
- Completely passive to user traffic.
- Very easy to deploy – just build a mirror port.
- Currently in use



TICAP 2.0 Initial Design



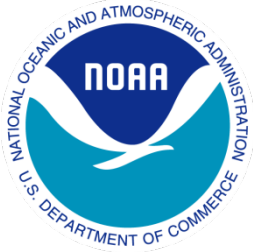
- Port mirror of egress/ingress traffic to security analysis systems.
- Inline Firewall and web Gateway.
- More complex to install, requires in-depth network engineering to meet NOAA mission requirements



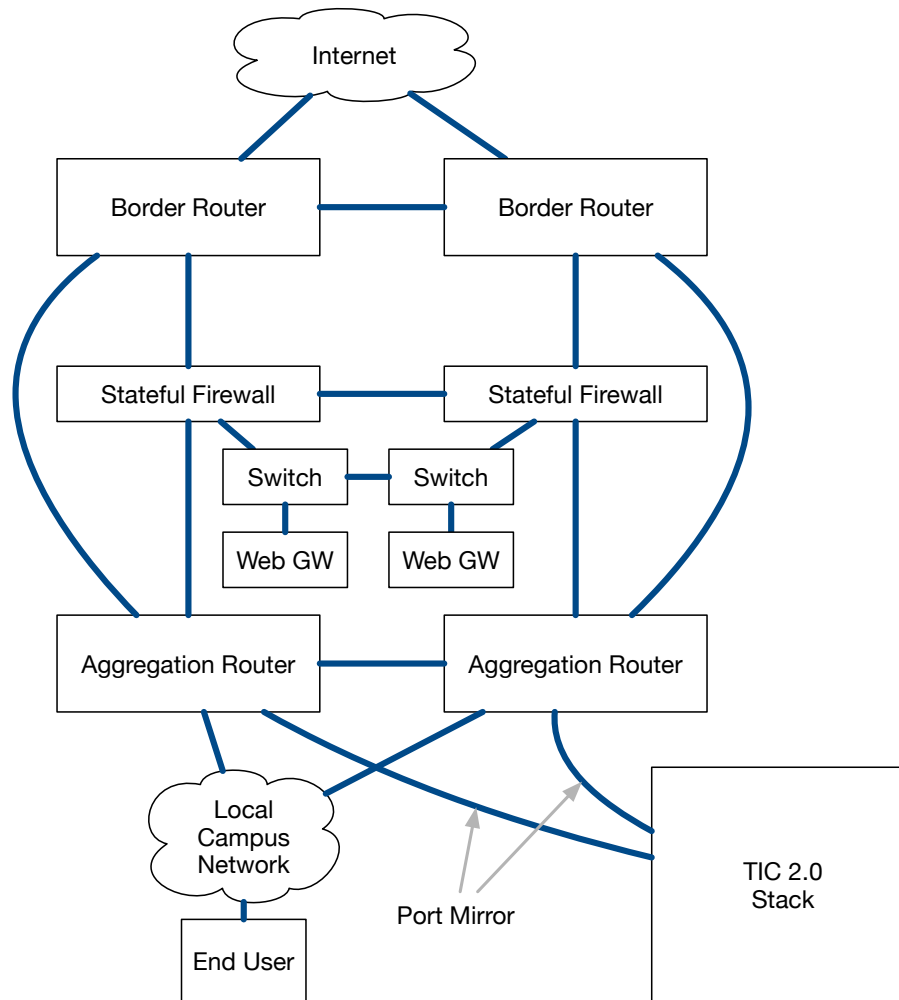
TICAP Deployment Considerations



- Design must be standardized across all TICAPs
- Design must be supported by NOC and NCSC
- Design must be scalable (from IRC->DC)
- Hardware failure is expected
- Customer impacts must be minimized
- Redundancy must extend north and south of the TICAP firewalls
- Design must account for symmetric flow across firewalls



High Available TICAP 2.0

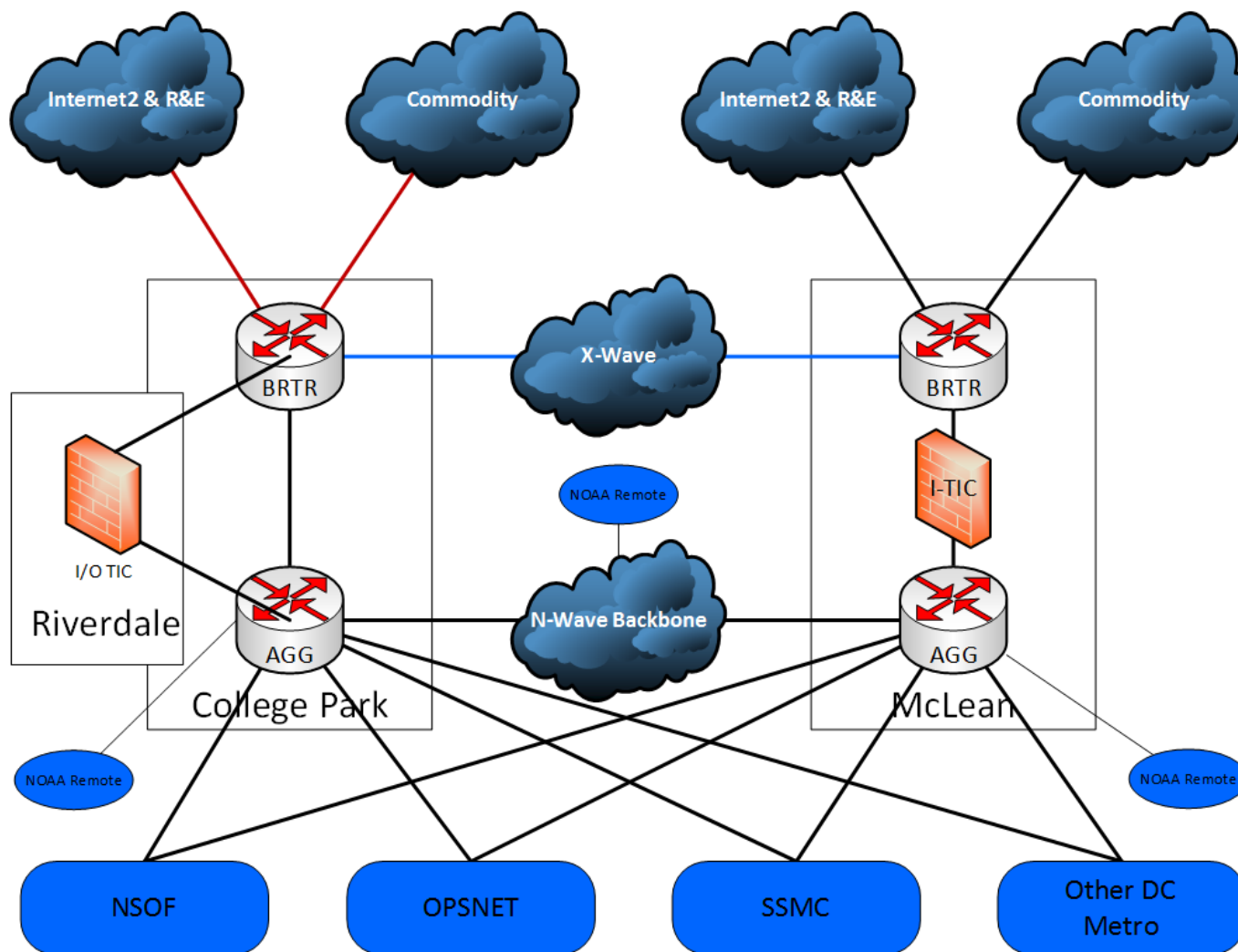


- I-TIC
- O-TIC
- Redundant Network Hardware
- Redundant Security Hardware



NOAA TIC Architecture

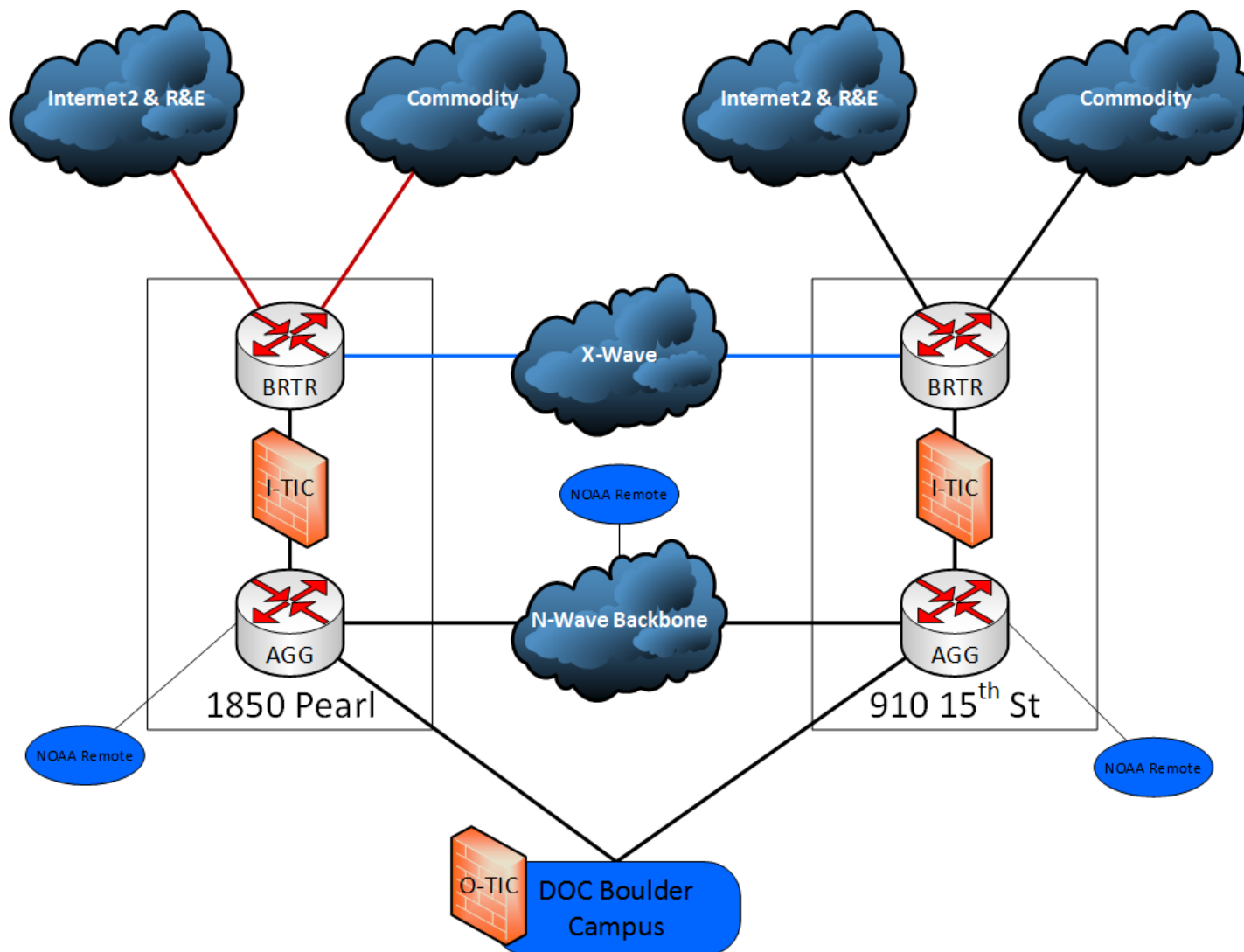
Engineering Resilient TICAPs – DC Metro





NOAA TIC Architecture

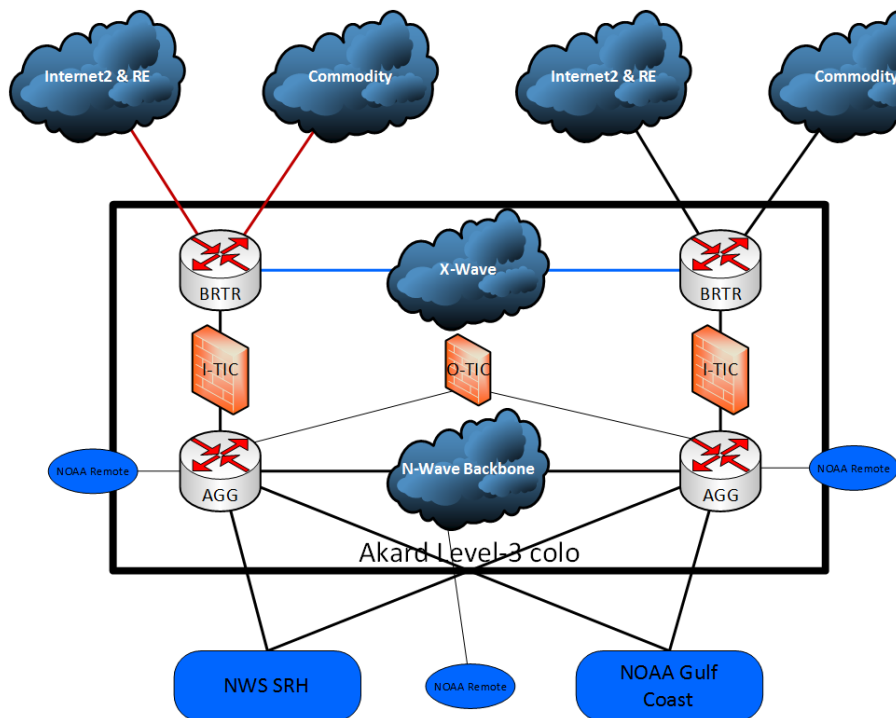
Engineering Resilient TICAPs – Denver



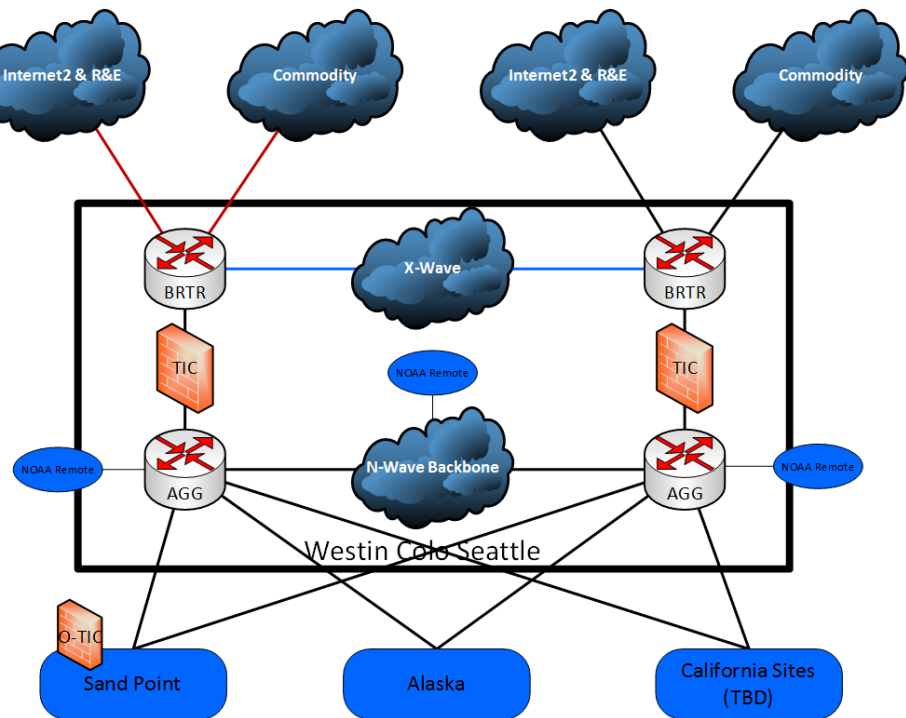


NOAA TIC Architecture

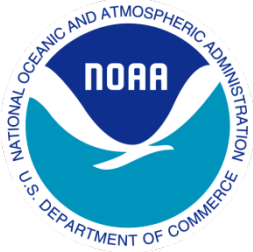
Engineering Resilient TICAPs – Dallas/Seattle



Dallas



Seattle



Trusted Internet Connection (TIC) Partnership between CSD and N-Wave

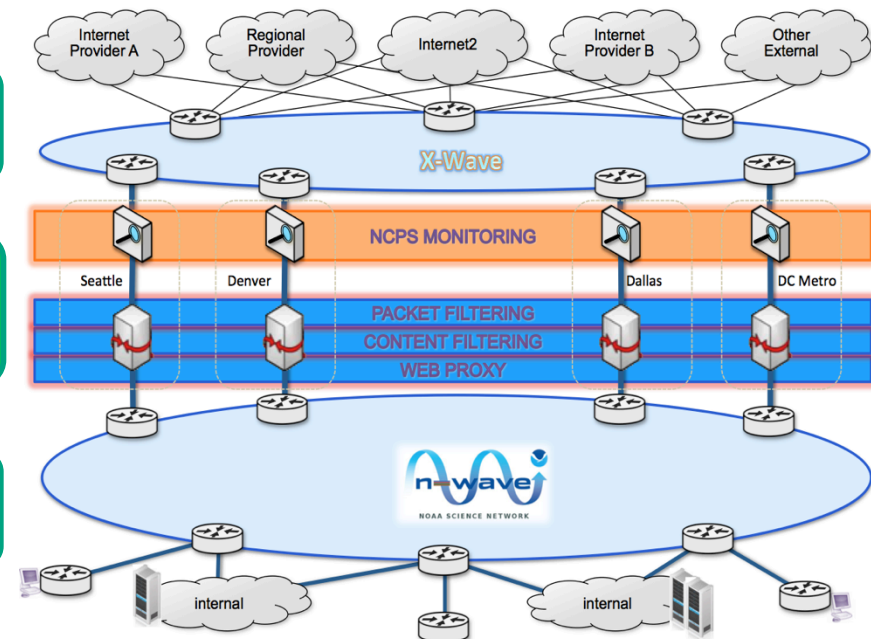


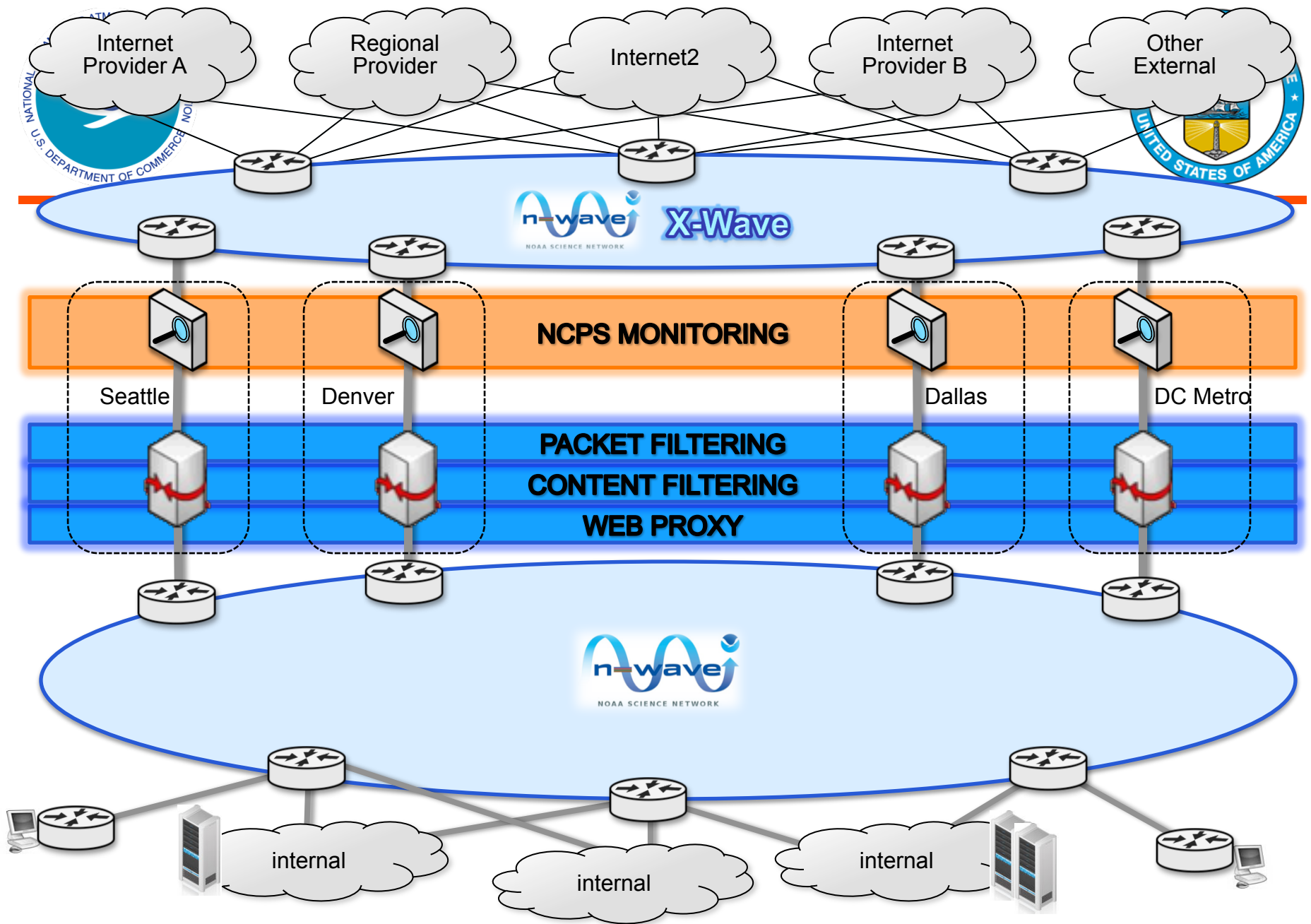
- Two Areas of Responsibility : Security, Network
- Two Reportable Metrics
 - % Security Controls Implemented, % Traffic Consolidated
- Cyber Security Functions
 - Security Operations
 - Security tools
- N-Wave
 - Network
 - Facilities
 - Infrastructure Build

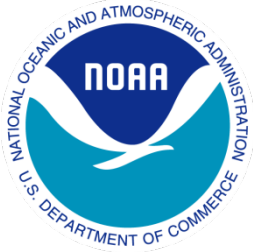
Network

Security

Network







X-Wave



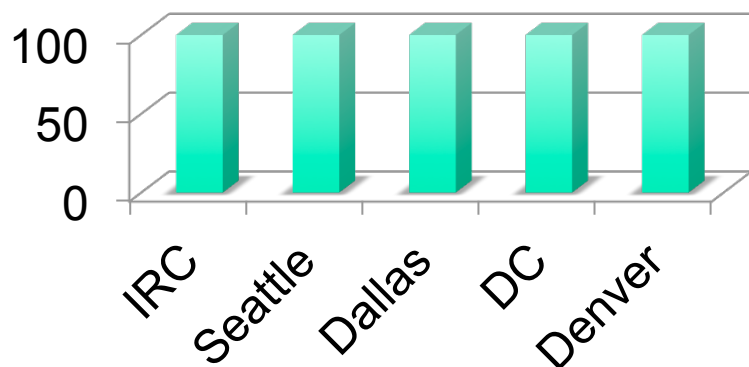
- Provide a peering infrastructure for network redundancy and failover between TICAP sites
- Enforce symmetrical IP traffic routing through the TIC
- Consolidate and share ISP connections and R&E network connectivity
- External networks (providers, cloud, other direct partners) can land in X-Wave, for routing to NOAA via TIC
- X-Wave can provide locations for Science DMZs and low-risk public data delivery
- X-Wave and N-Wave need to be operated in a tightly coordinated manner to ensure policy and configuration synchronization.



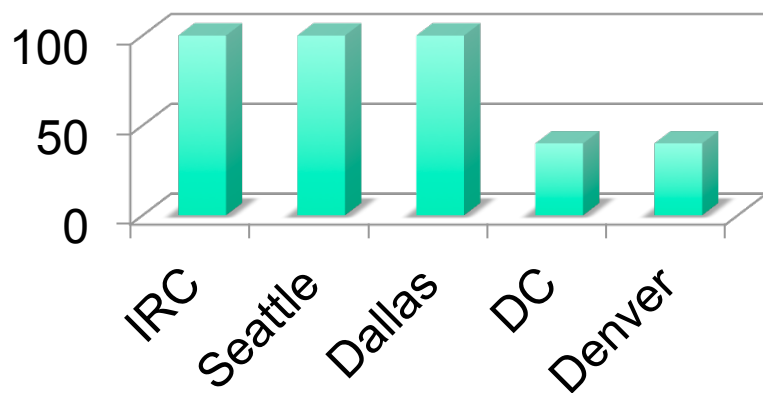
Project Status



- TICAP Infrastructure Deployed (hardware/intra TICAP component networking (O-TIC/ITIC) and wide area communications and peering services)



Campus, sites and program network migration to the new TICAP Infrastructures (will have O-TIC)

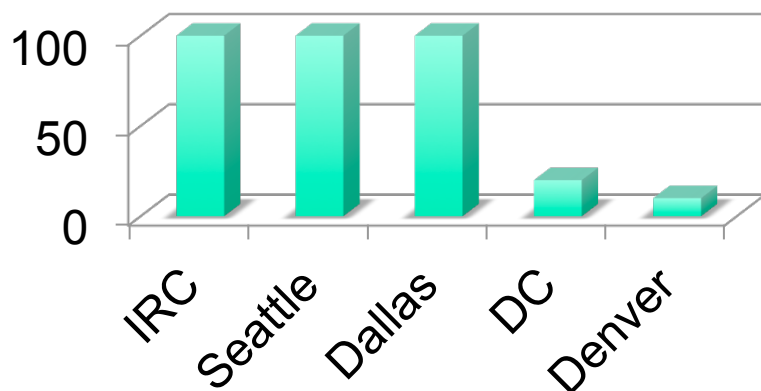




Project Status

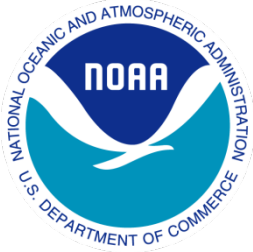


- Campus, sites and program full in-line TICAP migration (Firewall Web Proxy)

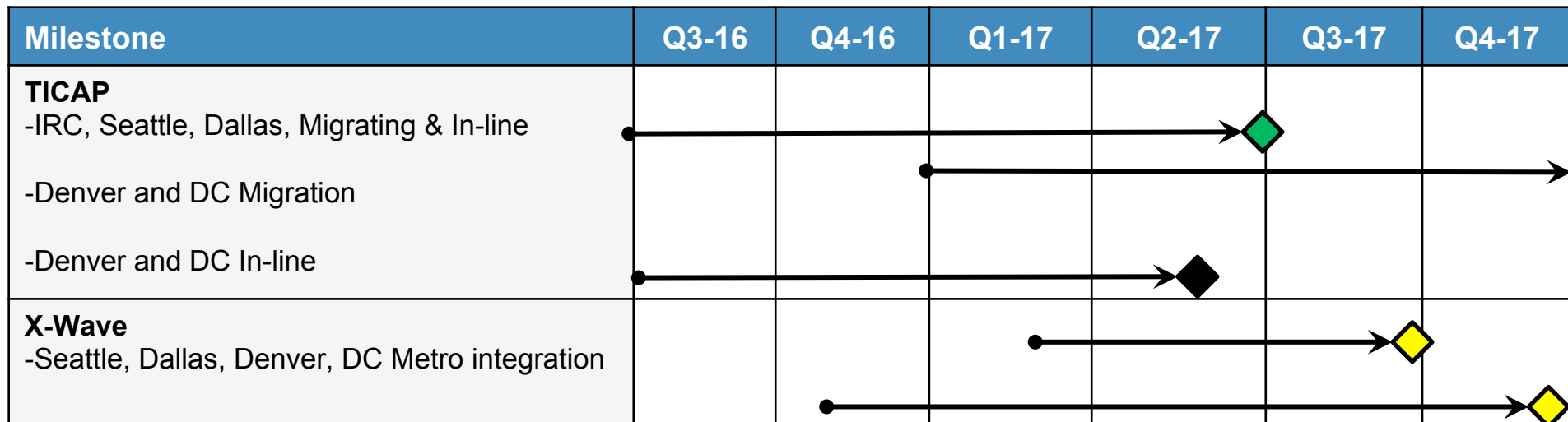


Community TICAP – Offer Services to other Federal Agencies

- Establish cost model - Draft was outlined 3/18/17, being refined and sent for management review
- Establish CONOPS for on boarding other agencies
- DHS annual assessment and assessment of required multi-agency controls (begins mid Q3 and carries through mid Q4)
- MAX partnership for Federal Agency transport



Schedule



Legend					
◆	Delayed	◆	On Schedule	●	Start
◆	Risk of Delay	◆	New Target Date	◆	Complete