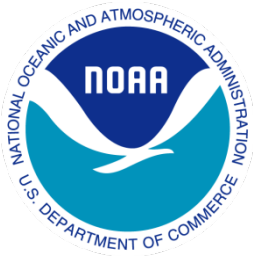


July 2014

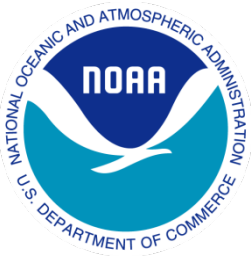
NOAA External Network Connectivity



Goals



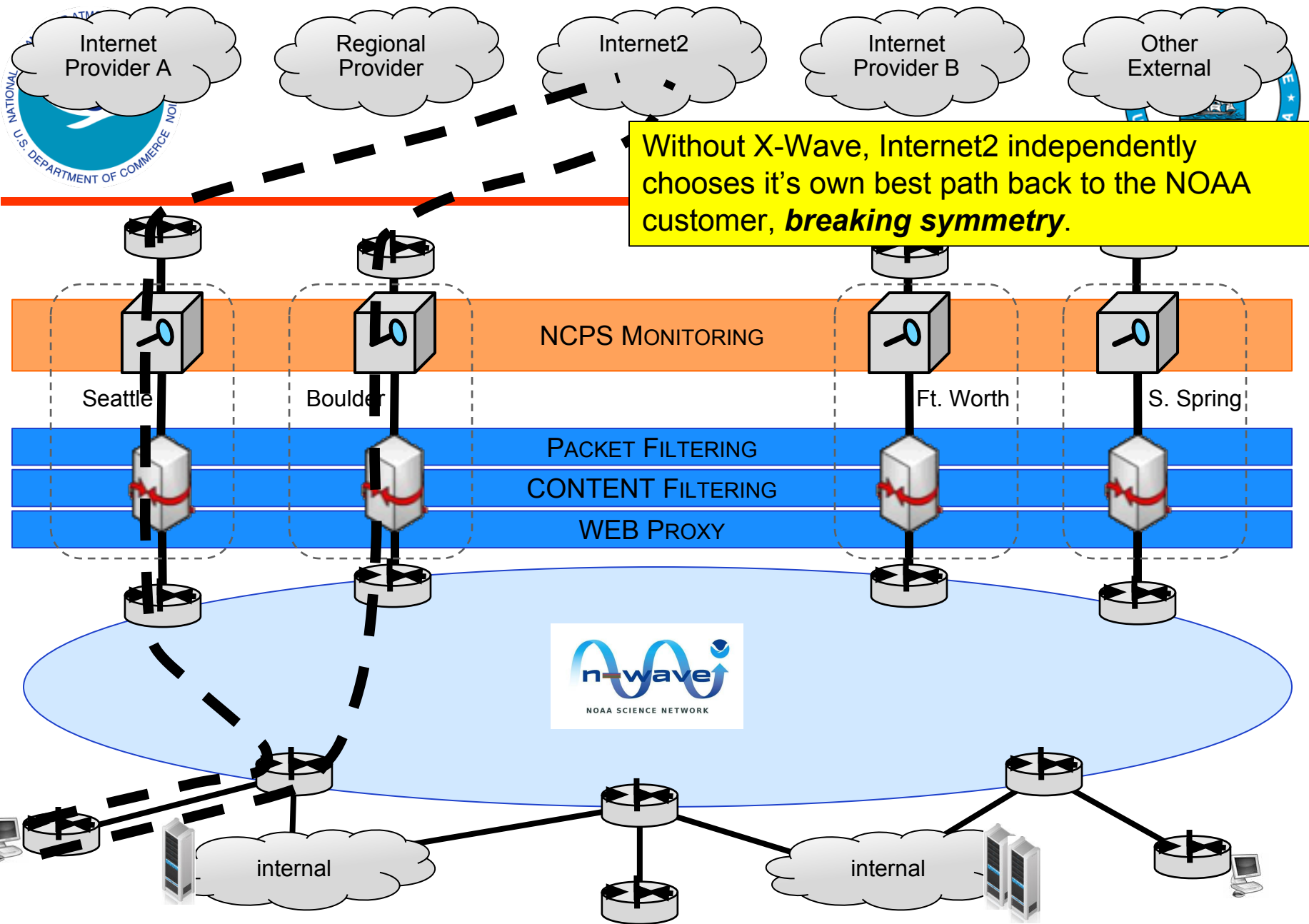
- Meet TIC requirements, including traffic symmetry.
- Maintain resiliency and avoid single points of failure.
- Maintain the ability to scale, grow, and change.
- Ensure efficient utilization of network circuits and resources.
- Provide cost-effective solutions for both smaller and larger NOAA offices.

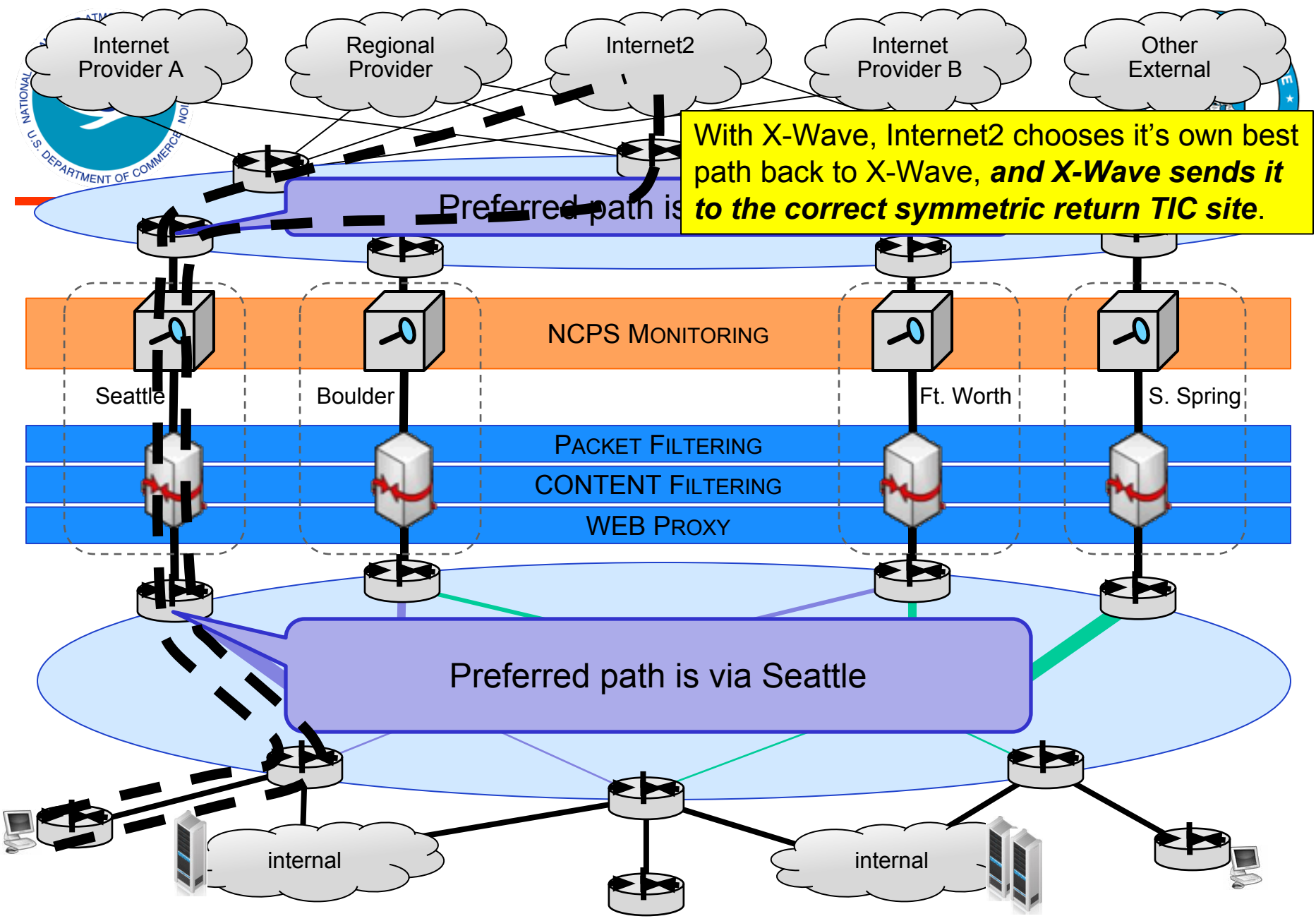


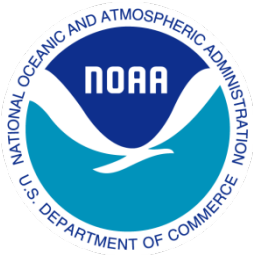
Traffic Symmetry Solutions



- A given office or location connects to all external resources and the Internet through a single TIC stack.
 - Simplest solution.
 - Poor availability due to outages and routine maintenance.
 - Difficulty growing and scaling.
- A given office or location maintains connections to multiple TIC sites, but only one may be in use at any given time.
 - “Warm spare” concept; backup pipe is unused until primary breaks.
 - Inefficient use of resources; expensive.
 - Difficult to ensure backup will always work properly when needed.
- An office or location connects via an entity that controls traffic routing on both sides of the TIC stacks, ensuring symmetry.
 - High availability; automatically resilient under failures.
 - Easy to scale and add additional connections.
 - Efficient use of resources; allows load-balancing.



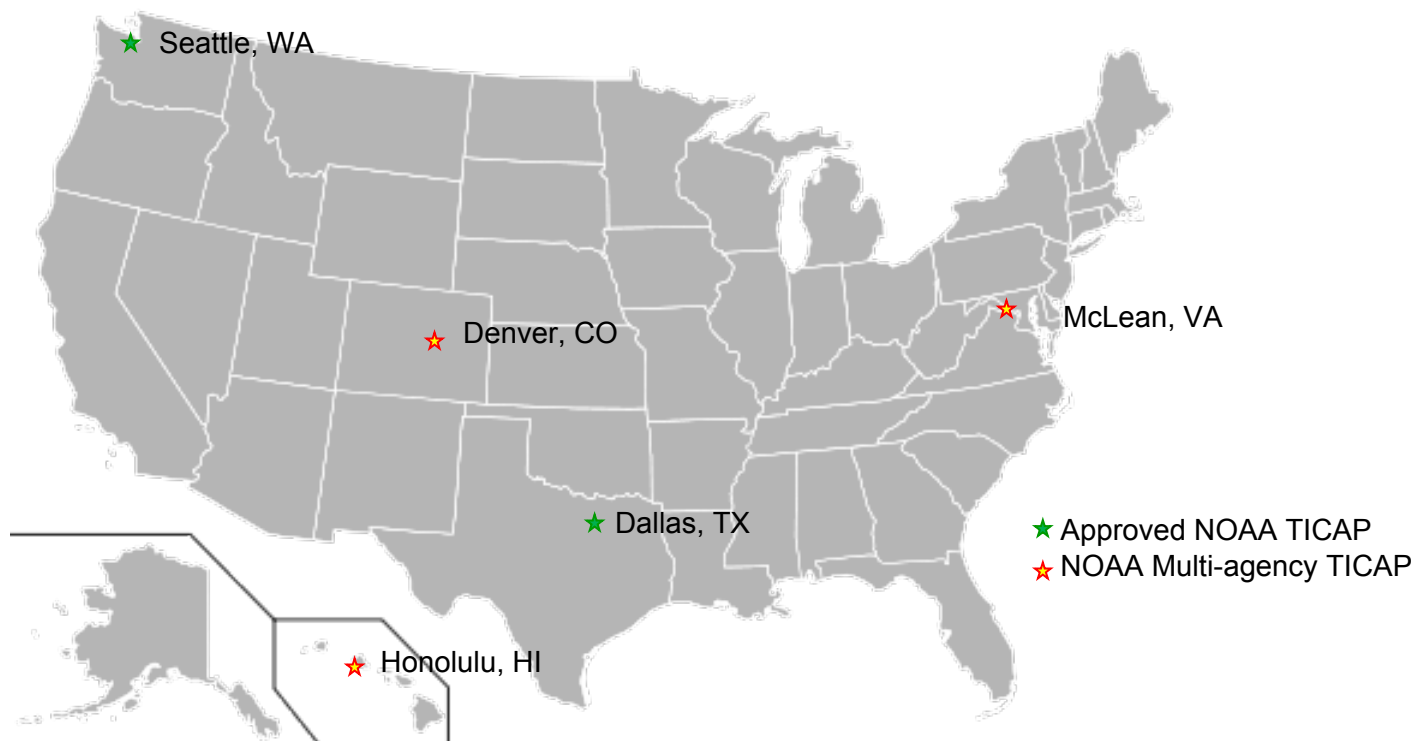


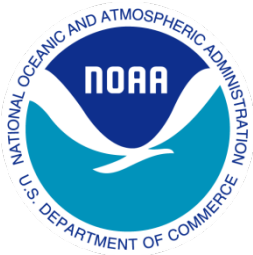


NOAA TIC Architecture



- Initial TICAPs established
- All external (e.g., non-Fed) traffic must route through one of these sites

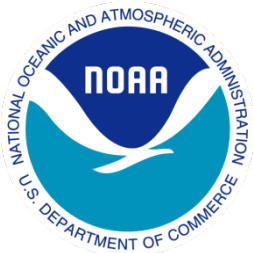




NOAA TIC Architecture (2)



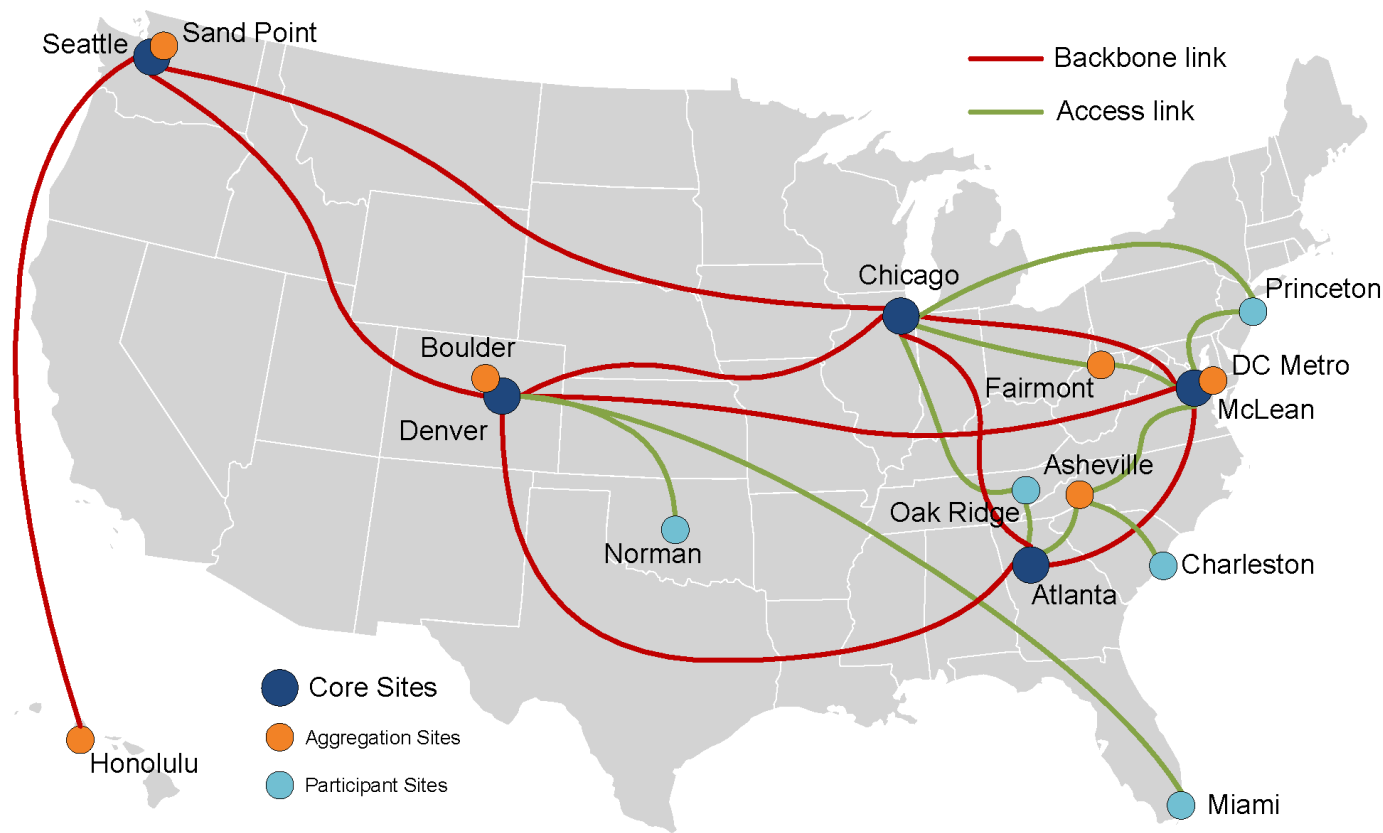
- NOAA's current networks (N-Wave, OPSnet, etc.) will continue to provide internal enterprise connectivity to NOAA sites
- NOAA will continue to leverage commercial and R&E partners for continued access via TIC sites
- NOAA will use N-Wave where applicable to support TICAP transport
- NOAA is pursuing a new, external peering network: X-Wave



NOAA TIC Architecture (3)



NOAA will use N-Wave where applicable to support TICAP transport



N-Wave National Network 2014



NOAA Interim TIC Architecture



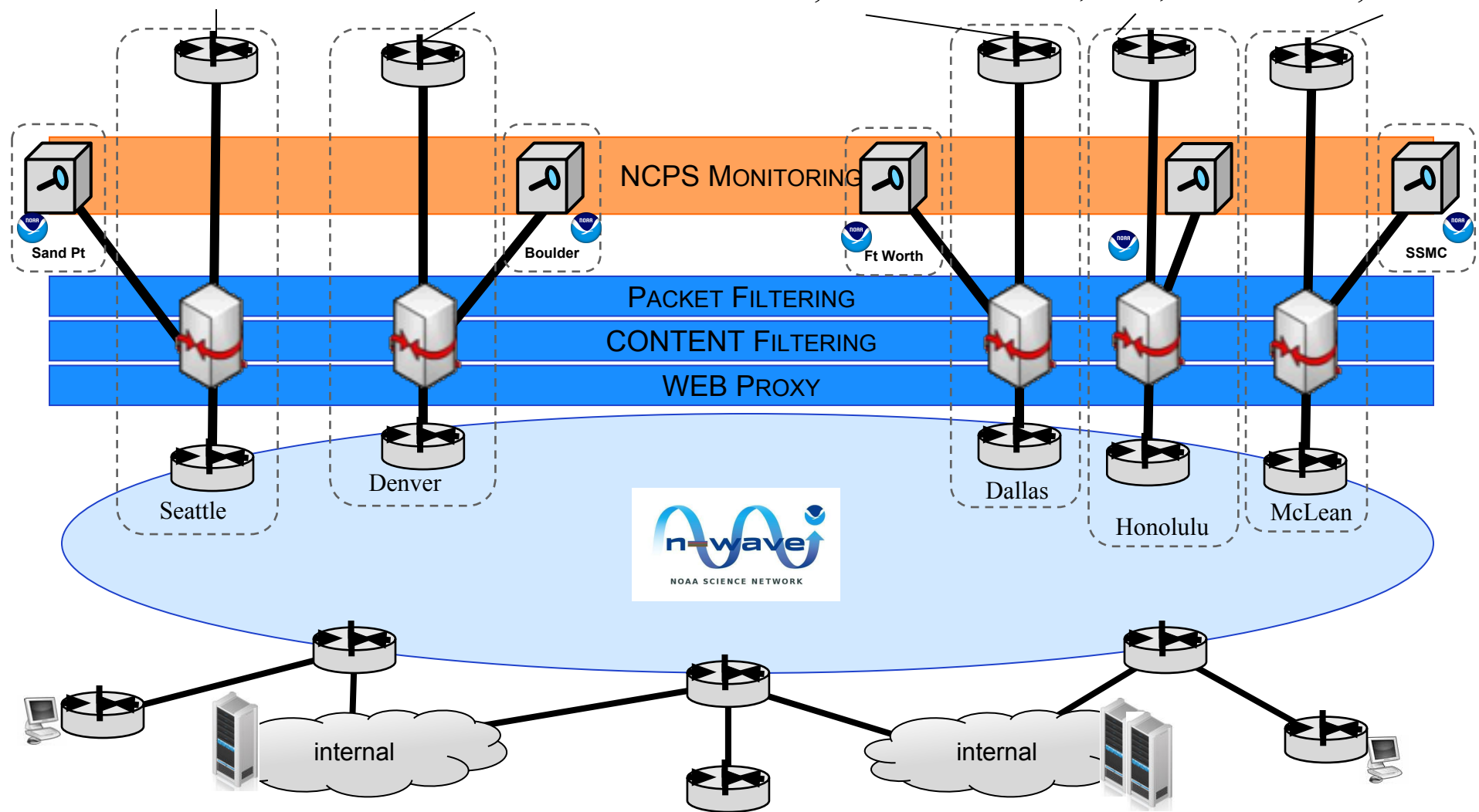
ISPs, PNWG

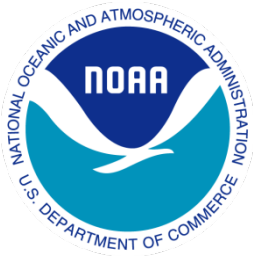
ISPs, FRGP

ISPs, LEARN

ISPs, UH, HIX

ISPs, MAX

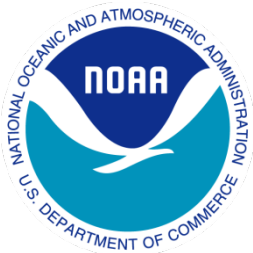




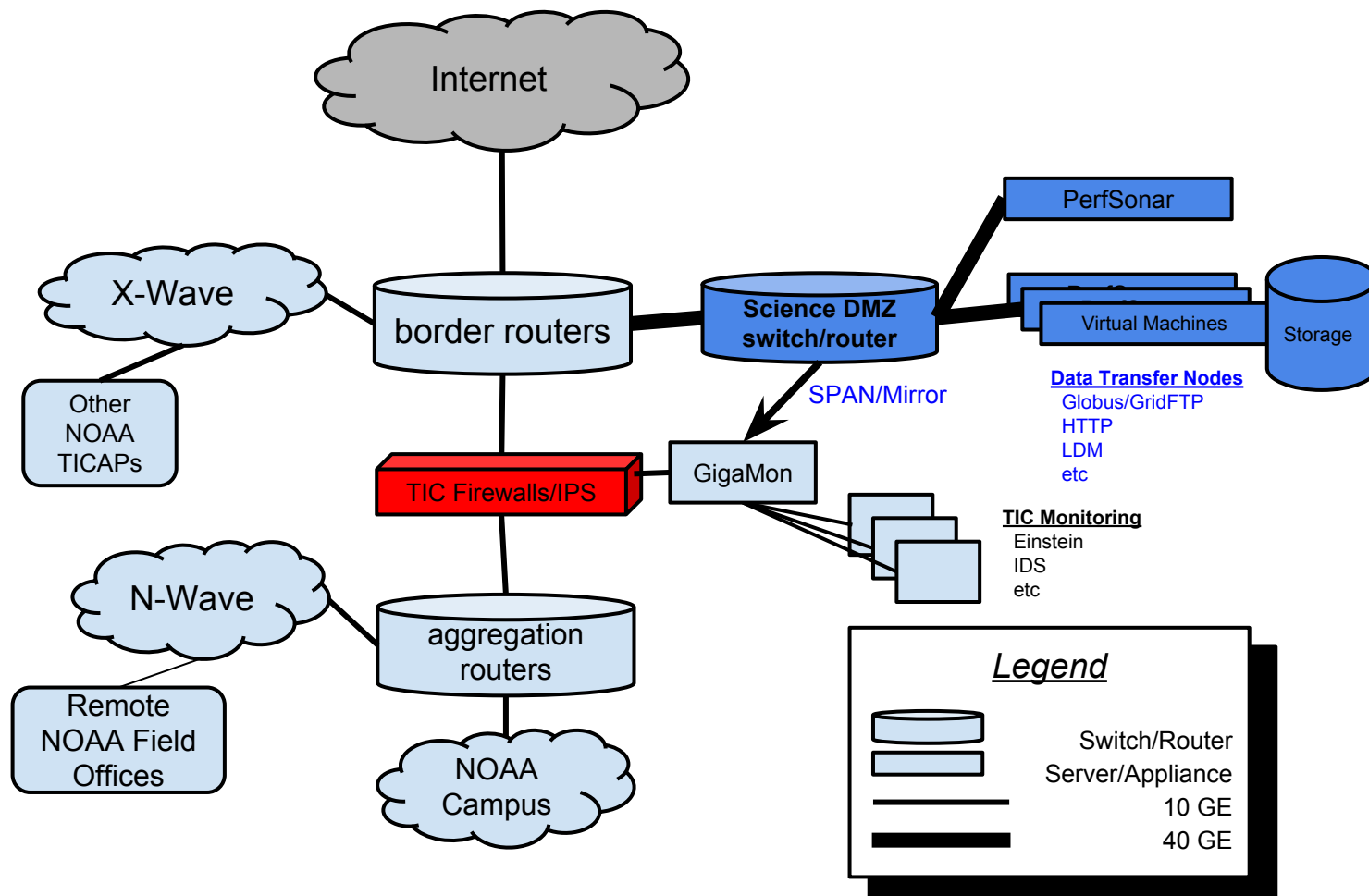
X-Wave

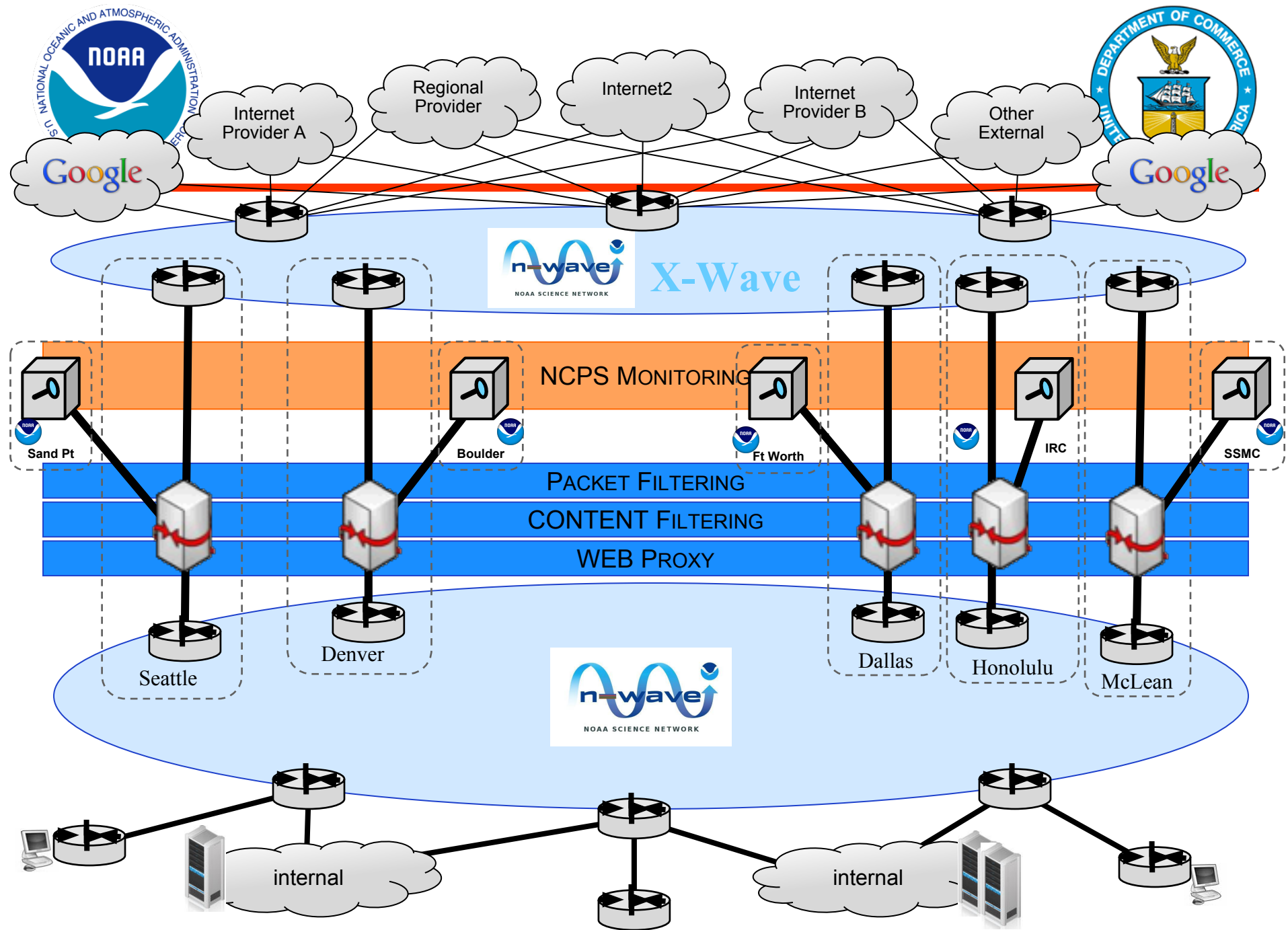


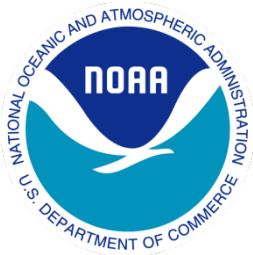
- Provide a peering infrastructure for network redundancy and failover between TICAP sites
- Enforce symmetrical IP traffic routing through the TIC
- Consolidate and share ISP connections and R&E network connectivity
- External networks can land in X-Wave, for routing to NOAA via TIC
- X-Wave can provide locations for Science DMZs and low-risk public data delivery



Typical Science DMZ







Thank You



Questions?

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