



ESnet

ENERGY SCIENCES NETWORK

ESnet6 Overview

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U.S. DEPARTMENT OF
ENERGY

Office of Science



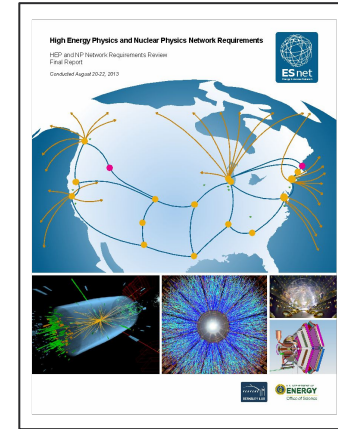
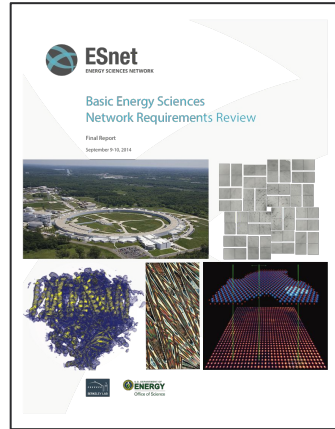
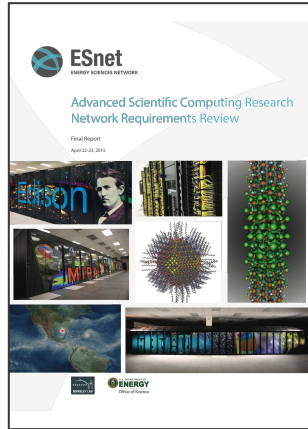
ESnet is a Science Mission Network

Mission: *To Enable and Accelerate Scientific Discovery by Delivering Unparalleled Network Infrastructure, Capabilities, and Tools.*

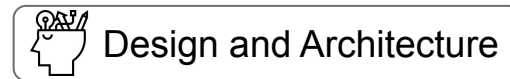
Impact on ESnet6 Network Design:

- Providing the appropriate **services**.
- Meeting the **capacity** requirements.

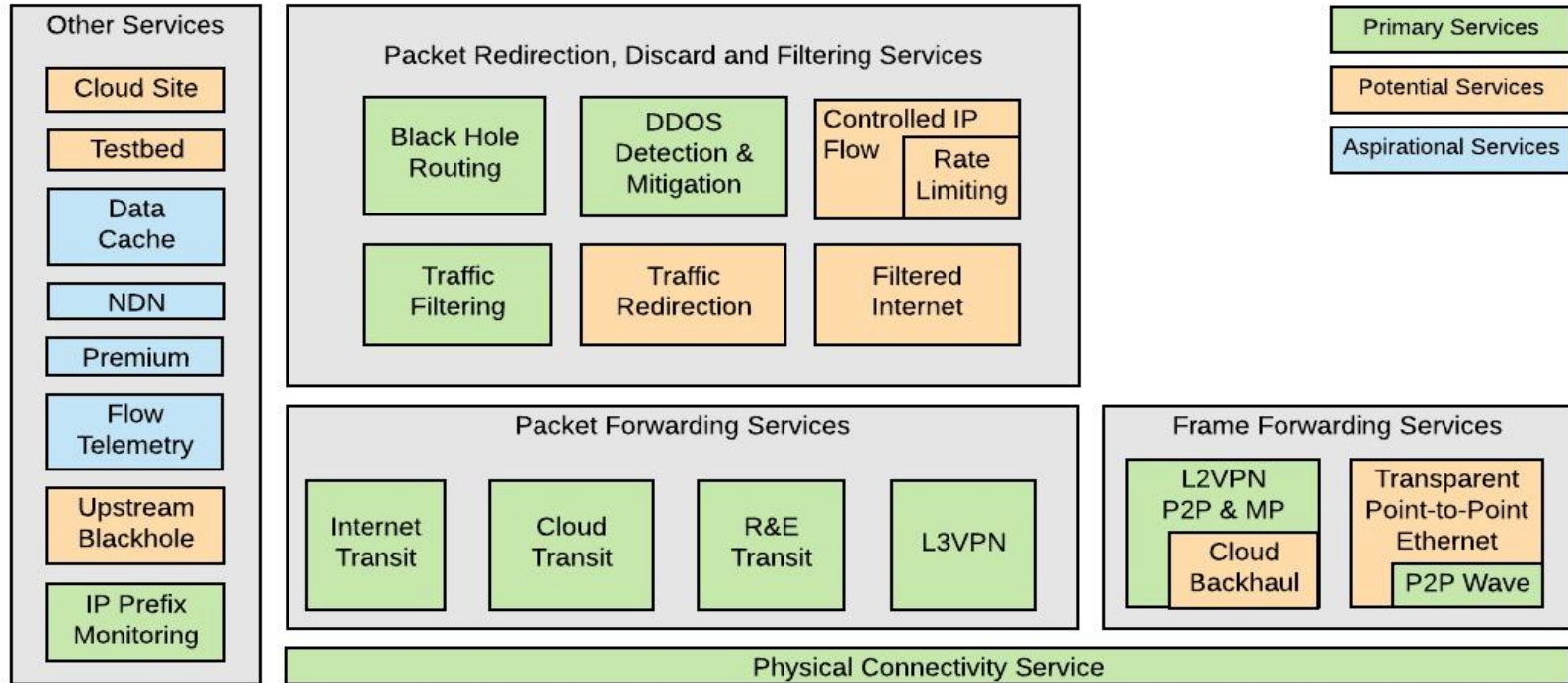
ESnet Services Definition Process



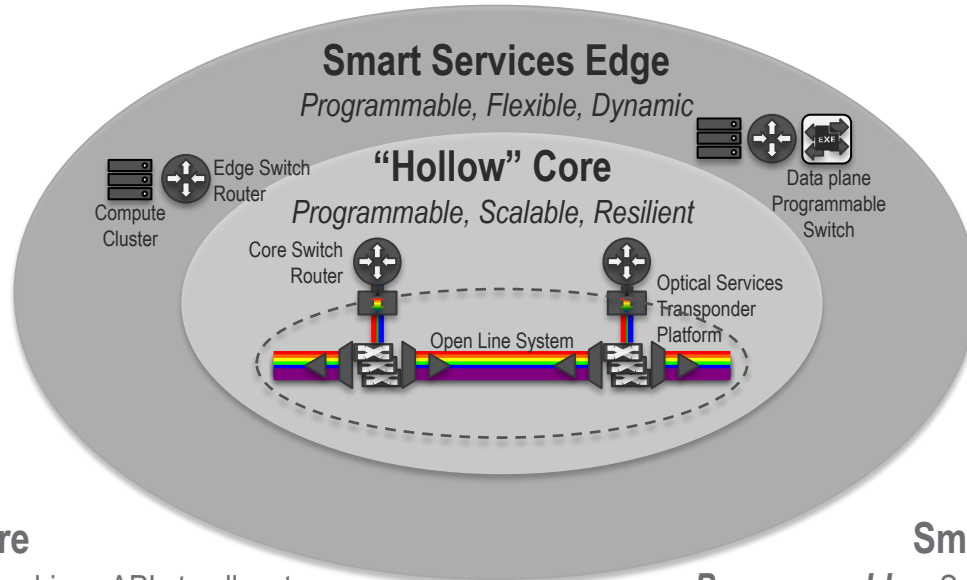
- Requirements gathered from (6) DOE Office of Science program office requirements workshops.
 - Advance Scientific Computing Research (ASCR)
 - Basic Energy Sciences (BES)
 - High Energy Physics (HEP)
 - Biological and Environment Research (BER)
 - Fusion Energy Sciences (FES)
 - Nuclear Physics (NP)
- Input on requirements are documented as workflows, which are then formalized as services, driving the design and architecture.



ESnet6 Network Services



ESnet6 (“Hollow-Core”) Architecture Overview



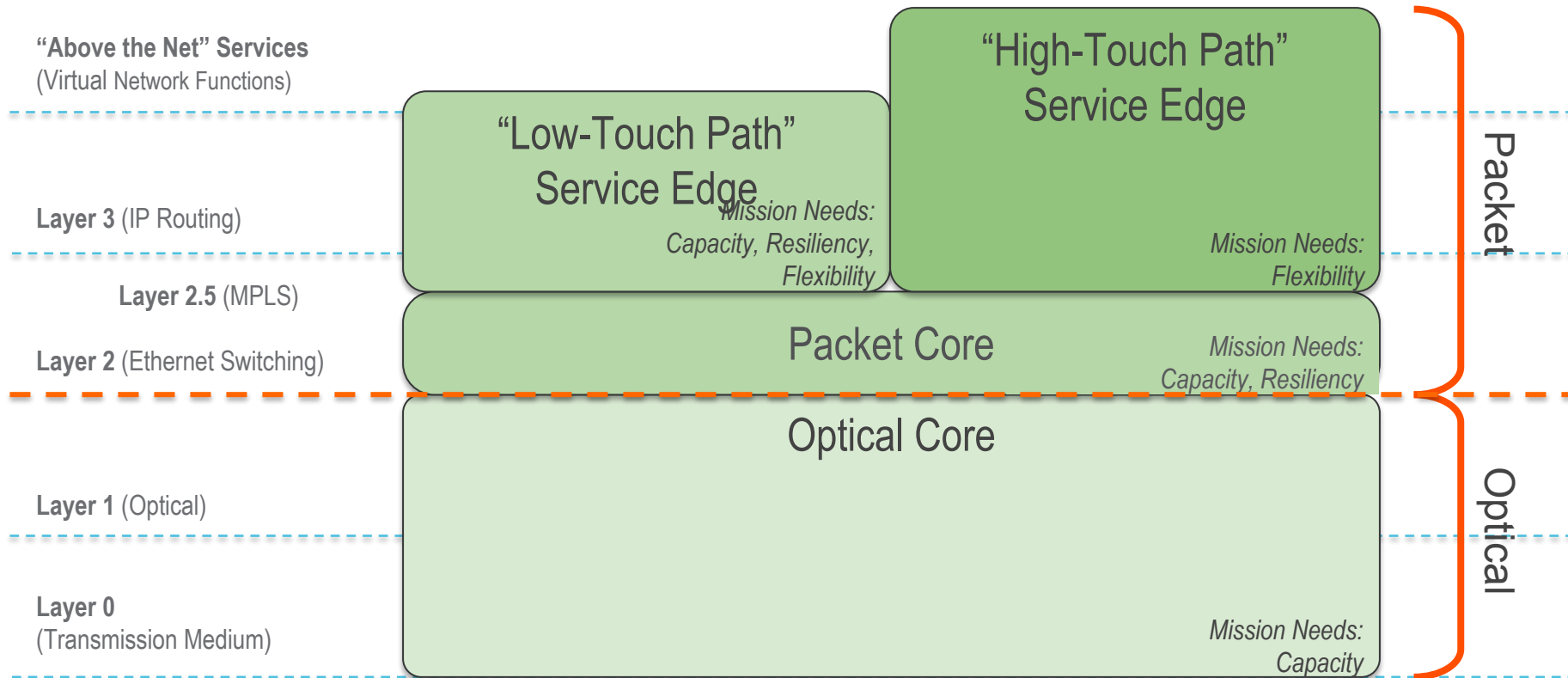
“Hollow” Core

- **Programmable** – Software driven APIs to allocate core bandwidth as needed, and monitor status and performance.
- **Scalable** – Increased capacity scale and flexibility by leveraging latest technology (e.g. FlexGrid spectral partitioning, tunable wave modulation).
- **Resilient** – Protection and restoration functions using next generation Traffic Engineering (TE) protocols (e.g. Segment Routing (SR)).

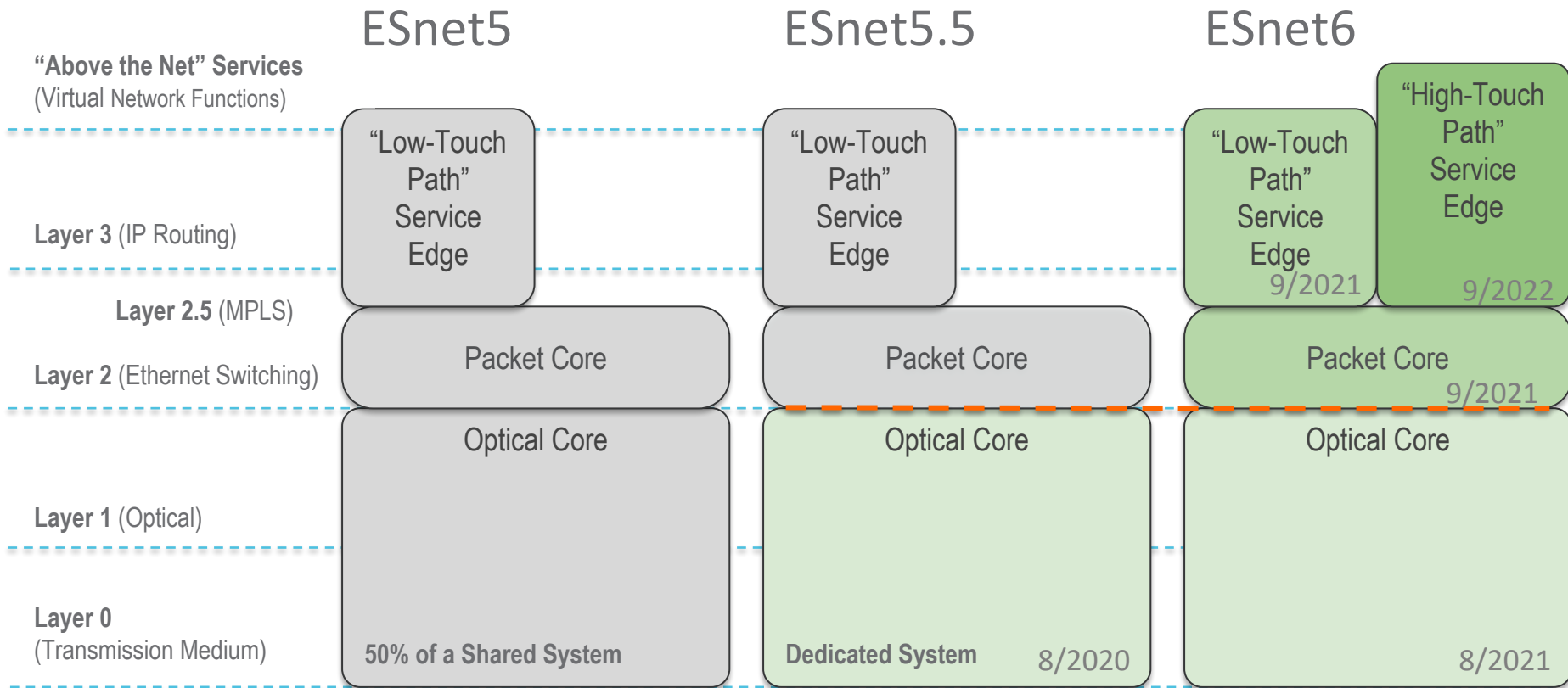
Smart Services Edge

- **Programmable** – Software driven APIs to manage edge router/switch and retrieve telemetry information.
- **Flexible** - Data plane programmable switches (e.g. FPGA, NPU) in conjunction with compute resources to prototype new services (driven by Software Defined Networks (SDN))
- **Dynamic** – Dynamic instantiation of services using SDN paradigms (e.g. Network Function Virtualization (NFV), Virtual Network Functions (VNF), service chaining).

Layered Architecture Drives Deployment Strategy



ESnet5 to ESnet 5.5 to ESnet6 Transition Overview

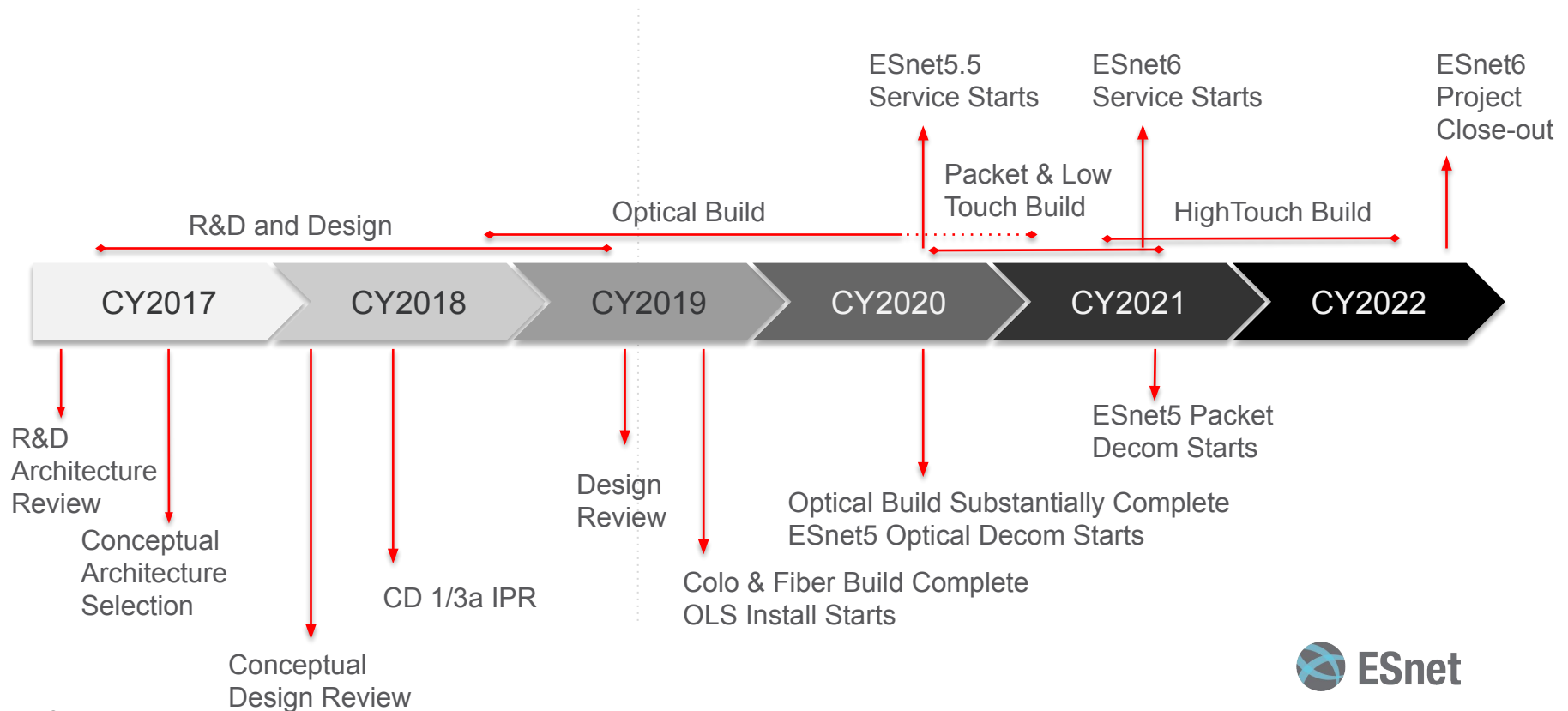


Gray - ESnet5

Green - ESnet6



ESnet6 Project Implementation Timeline



What's Next?

2019

May: Finished Final Design Review

Summer: Finish up Fiber and Colo Procurements & Acceptance

October: Complete Optical Vendor Selection & Start Deploying

December: CD 2/3 Review

Questions...

