

Photonic Plug Control Architecture

CCAMP WG, IETF117

draft-davis-ccamp-photonic-plug-control-arch

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Summary of proposal in draft

- Photonic control functions directly control the photonics of the network
 - Including the photonic plugs in devices with packet functions
- These control functions determine the photonic network set-up ongoing
 - Photonic network setup can be complex
 - Plug photonic settings may need to be changed during restoration etc.
- Clear separation of concerns between packet functions and photonic functions
 - Packet and photonic control/data can be partitioned
 - Packet control functions do not interfere with photonic control functions and vice versa.
- Three control architectures are examined
 - A single controller controlling all aspects of the network
 - A single control fabric with an assembly of interacting control components
 - A traditional control hierarchy partitioned by network technology domain
- Several network configurations are considered

- Other architectures and approaches are discussed elsewhere

Device considerations

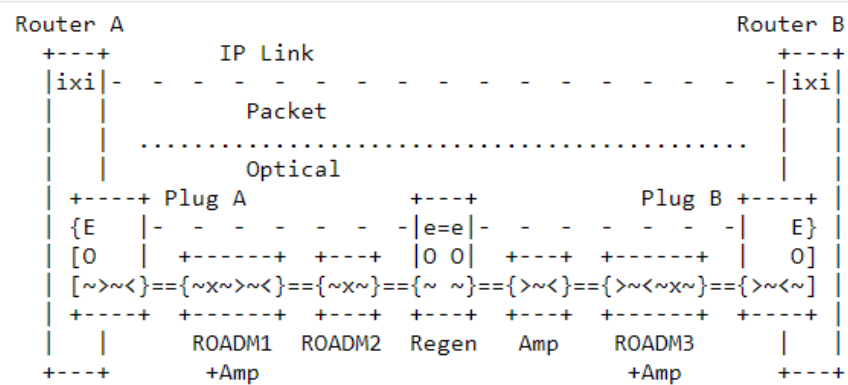


Figure 3: Optical network with regenerators

- The “router” is a device with packet and optical/photonic functions
- The devices straddle the packet and optical domains
 - The plug is in the optical domain

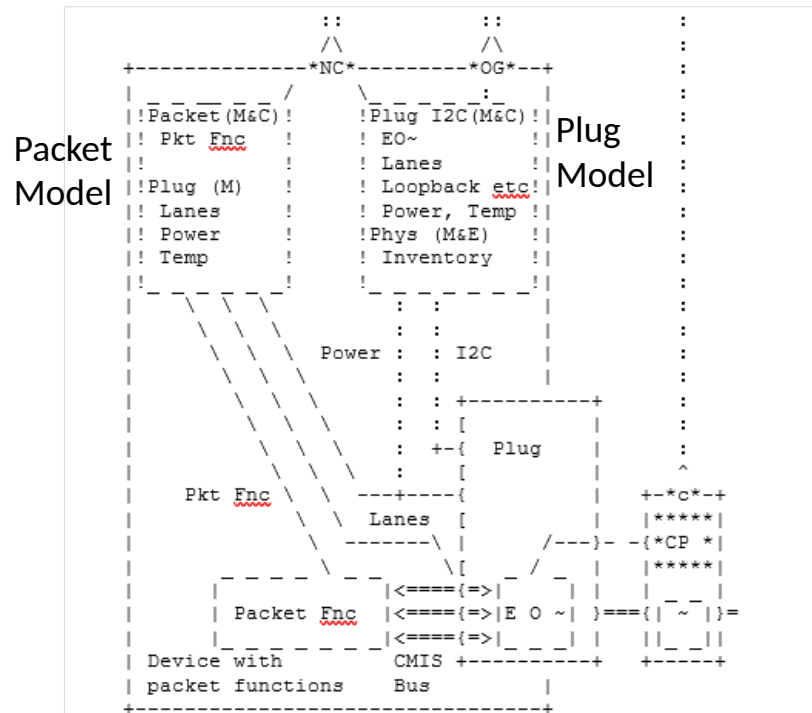
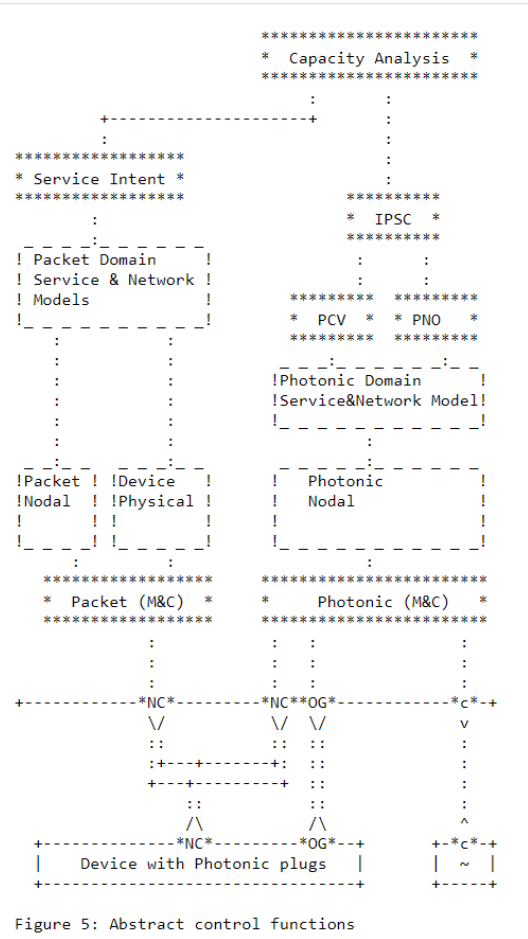


Figure 4: Device with packet function and a photonic plug

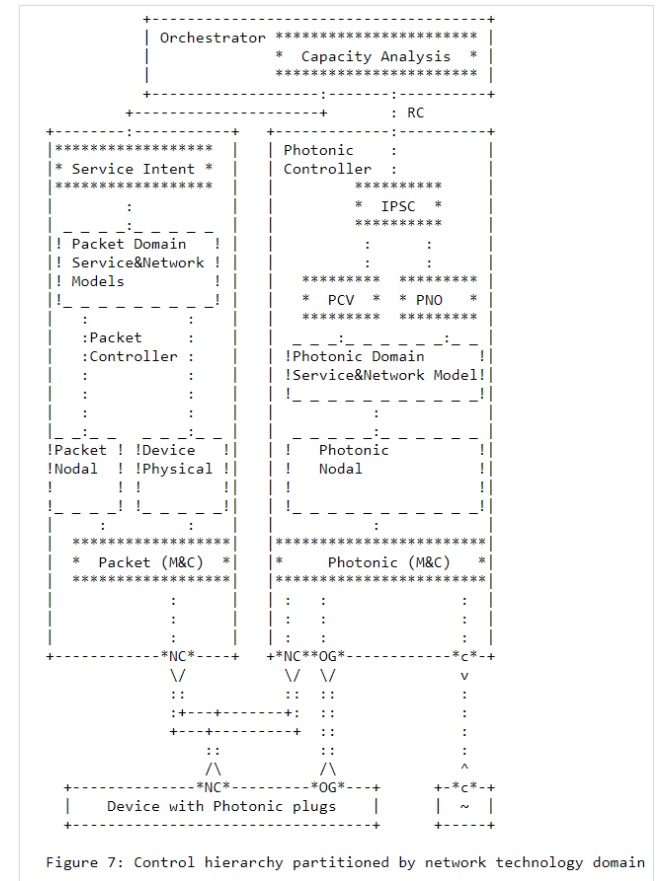
- Device with packet functions and a photonic plug has data/control related to:
 - optical/photonic functions of the plug
 - packet functions
- Data/control partitioned (minimally logically)
 - Control of one partition will not interfere with control of the other
- Photonic/Optical functions of plug controlled via
 - Control plane
 - OpenConfig model over gNMI
 - A model over Netconf

Control considerations



- A stylized view of control functionality is presented
 - This does not align with any particular architecture or terminology
- The photonic control functions are expanded to show
 - Connection viability
 - Network optimization
 - Inter-packet-site capacity management
- The functions
 - Could be assembled into a single controller
 - Could be considered as the functions from various vendors arranged in a single control fabric

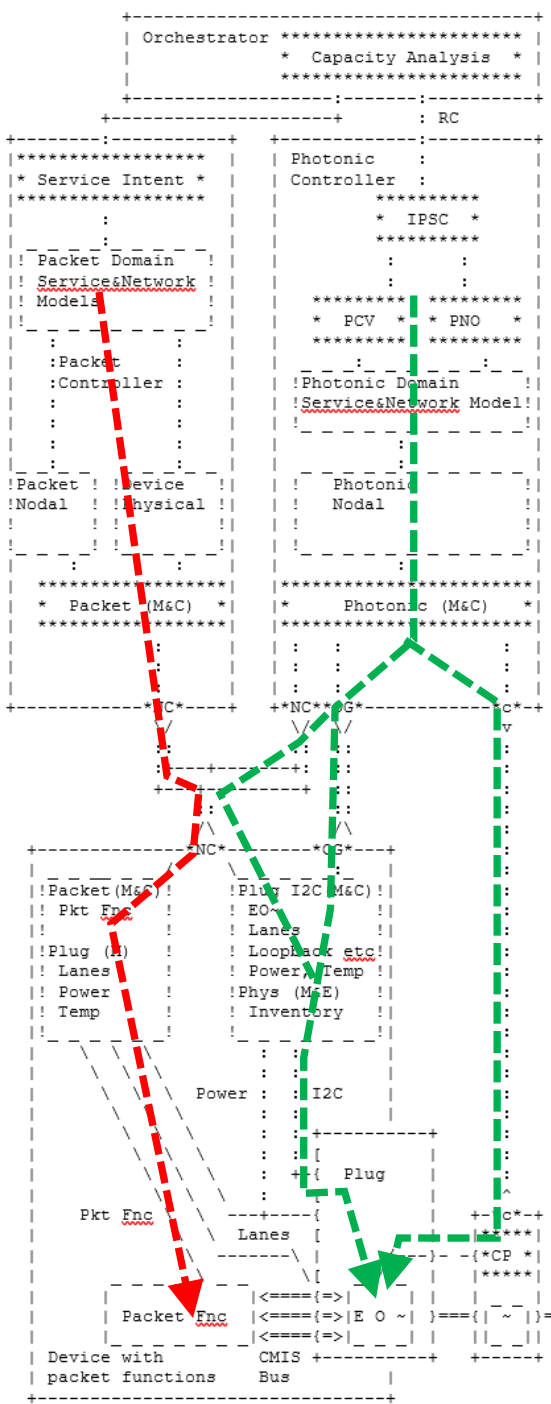
Note: The device is summarized in the figure due to scale challenges



- The same functions may be arranged in traditional hierarchy
 - Photonic/Optical network control via the Photonic Controller
 - Packet network control via the Packet Controller
 - Whole network assembled by an orchestrator
- This grouping may be driven by an administrative partition where there is a packet operations team and a photonics operations team

Direct control from Specialist control components

- Photonic controller controls photonic functions
- Packet controller controls packet functions
- Photonic/Optical functions of plug controlled via
 - Control plane
 - OpenConfig model over gNMI
 - A model over Netconf
- Packet functions controlled via a model over Netconf
- Device should provide essentially transparent access to the plug data and control



Experience and insight

- Many operators partition administration and control of packet and optical networks
- Some operators demand separate access to devices for packet control and for photonic control
- This leads to existing cases where there are two separate controllers for a single device

Next Steps

- Seek support for the draft and understand how to progress

Photonic control functions directly control the photonics of the network
Including the photonic plugs in devices with packet functions

Thank you!

Abstract

<https://datatracker.ietf.org/doc/draft-davis-ccamp-photonic-plug-control-arch/>

This document considers control of photonic plugs in devices with packet functions from an architecture perspective. Three specific control solution deployment strategies are examined:

- * network technology partitioned domain controllers, with an orchestrator (higher level controller) to coordinate the domain controllers
- * single controller dealing with all network technologies
- * single control fabric in which components, from various vendors, each focused on a specific control function, interact as peers to provide holistic control of the network

For all of the examined control solution deployment strategies, the control functions specializing in photonics determine the photonic network setup on-going and these control functions directly control the photonics of the network including the photonic plugs in devices with packet functions. There is a clear separation of concerns between packet function control and photonic function control such that the control can be partitioned so that control functions specializing in control of the packet network can control corresponding functions in the device with packet functions with no interference from the photonic control functions and vice versa.