

Control Architecture of Optical Pluggables in Packet Devices Under ACTN POI Framework

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

CCAMP WG

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Acknowledgment:

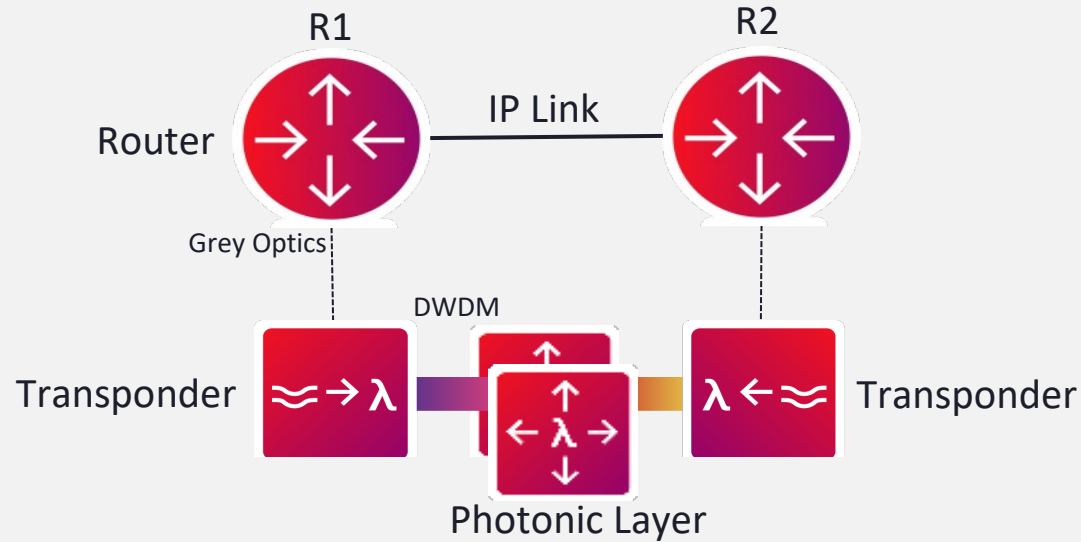
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Background: IPoDWDM (aka Packet Over Optical)

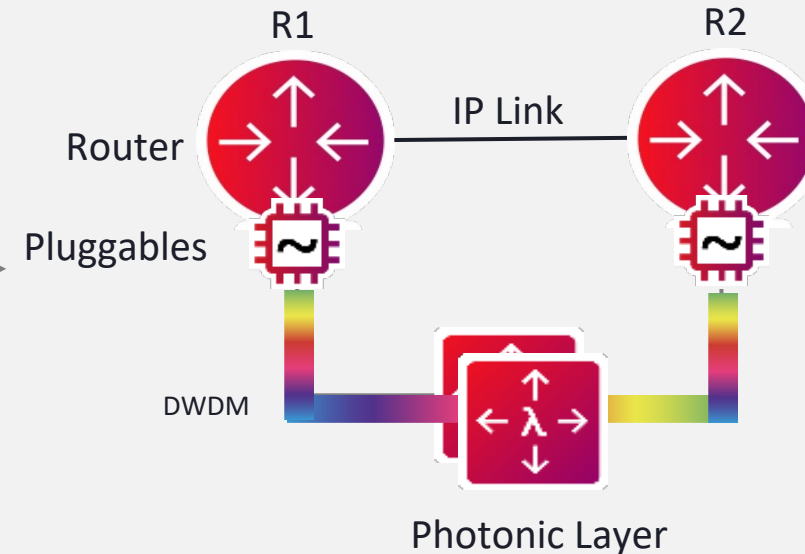
Note:

Pluggables = Plugs = Coherent Plugs = Optical Plugs

Traditional Architecture



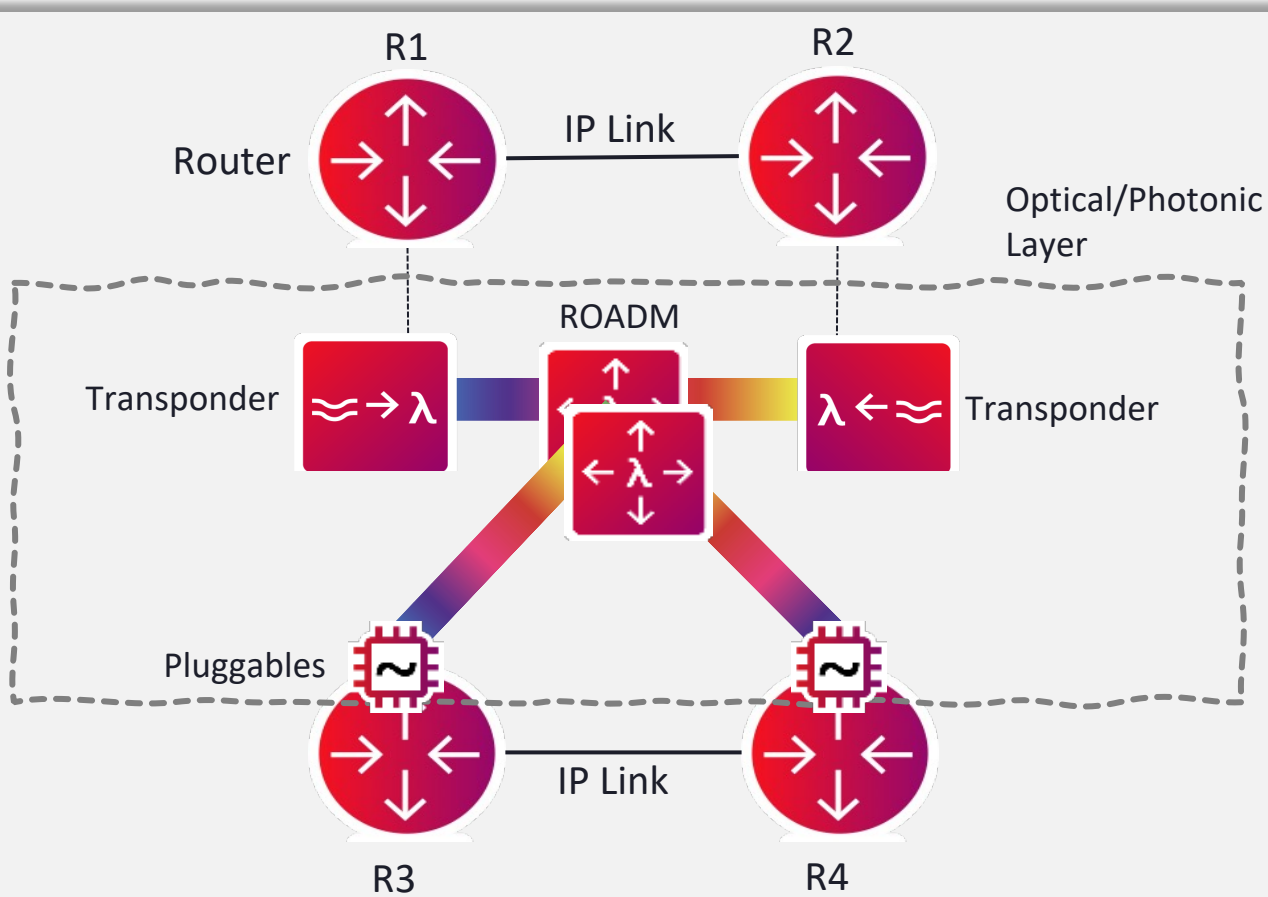
Architecture with Coherent Pluggables



- In both cases, there is a single IP link between Routers R1 and R2
- [Gray Optics + Transponders] are replaced with Pluggables inside Routers

Packet Over Optical Networks

Packet Over Optical Networks



In general, **any brownfield** Packet Over Optical networks will contain:

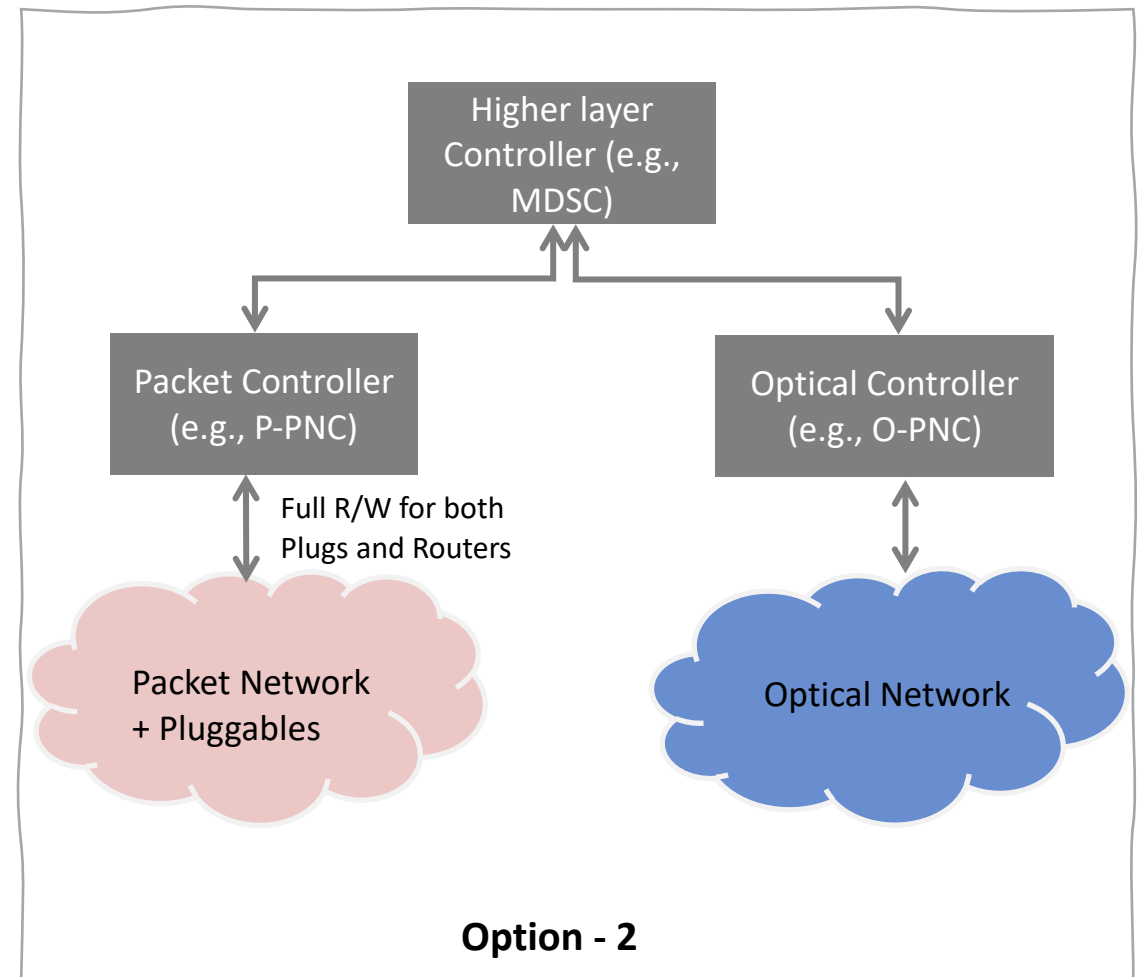
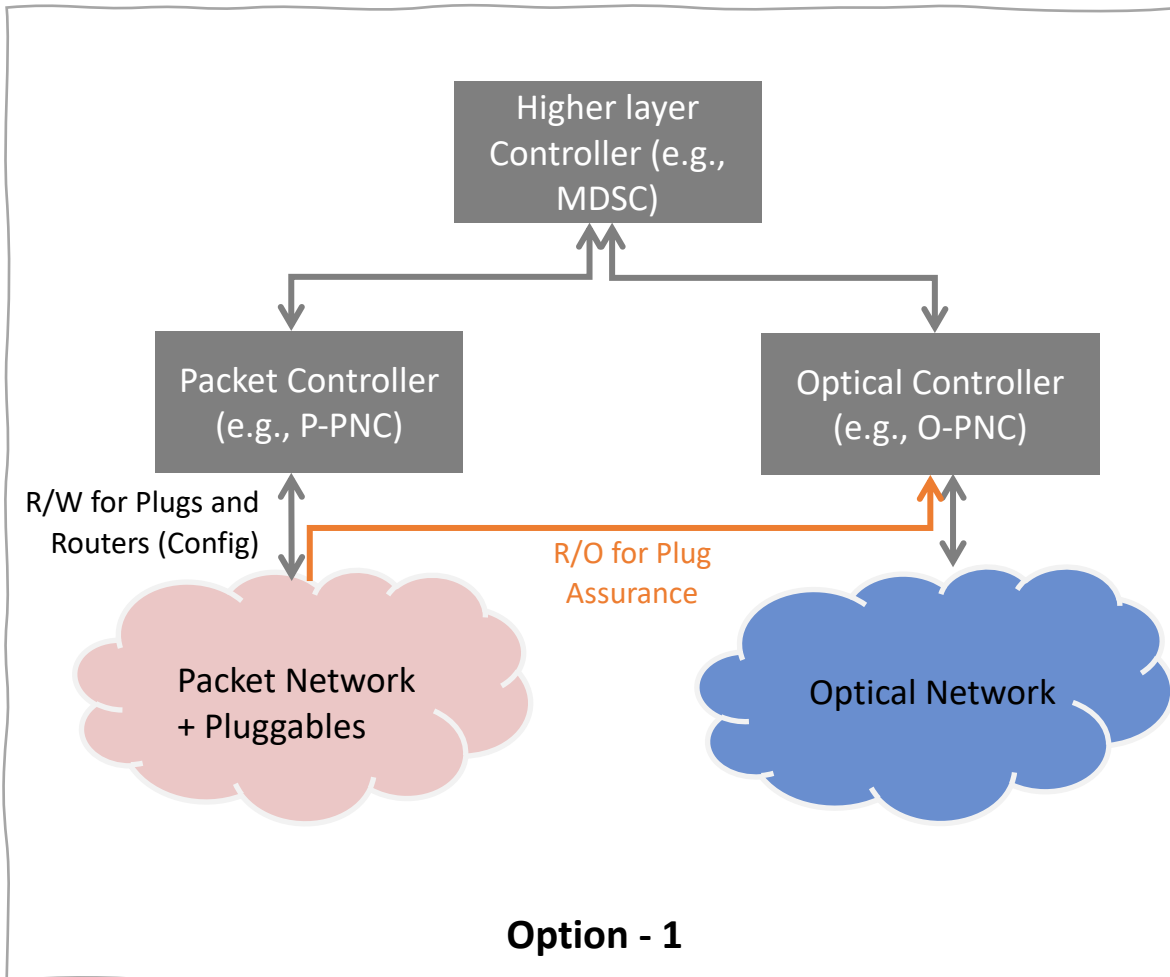
- Routers
- Transponders
- Photonic Layer (e.g., ROADM)
- Optical Pluggables

➔ For full automation of the packet over optical networks, all these components shall be considered.

Control and Life cycle management of IPoDWDM

Based on draft-poidt-ccamp-actn-poi-pluggable-02

Summary



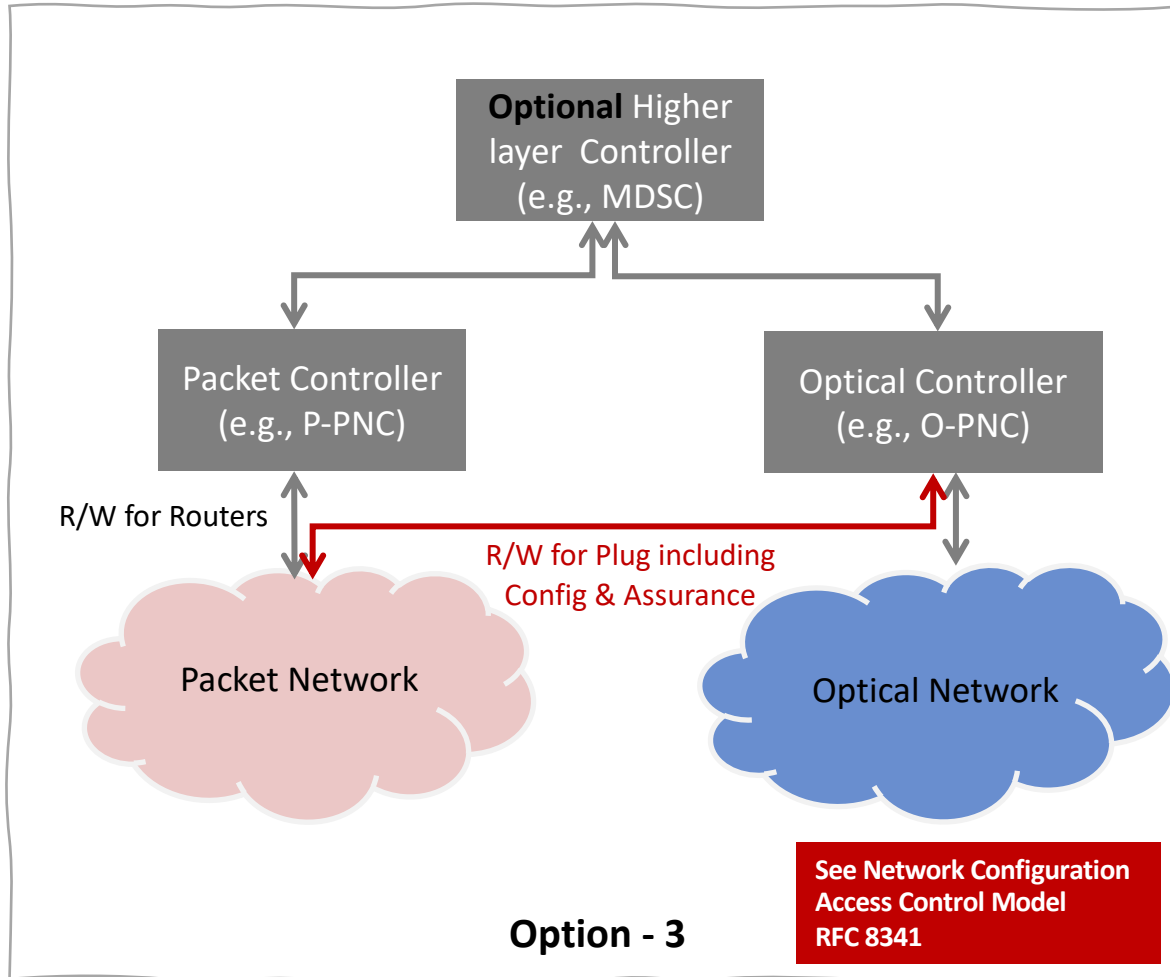
Summary of **draft-davis-ccamp-photonic-plug-control-arch**

Draft draft-davis-ccamp-photonic-plug-control-arch covers three areas:

- 1. Requirements:** Provides a set of requirements for full automation of multi-layer multi-domain packet over optical networks
- 2. Additional architectural option:** This draft presents an additional option (**i.e., Option-3**) to control of packet over optical networks by **complementing** draft-poidt-ccamp-actn-poi-pluggable
 - Provides full life cycle management of any end-2-end Optical services from plug-to-plug (**i.e., for Configuration, Assurance, telemetry collection, Optimization and Restoration / Protection**)
- 3. Clear separation:** The architectural option-3 also provides a clear separation between control of packet functions and control of optical functions

Control and Life cycle management of IPoDWDM

Option-3



1. Option-3 provides the R/W access of Coherent Pluggables to Optical Controller.
2. As a result, the Optical Controller can manage, plan, control and restore the E2E Optical services exactly the same:
 - From transponder to transponder
 - OR from Plug-to-plug
3. From Optical Controller point of view, the workflows for life cycle management of any Optical service (plug-to-plug or transponder-to-transponder) are identical
 - i.e., for Configuration, Assurance, telemetry collection, Optimization and Restoration / Protection)

Requirements introduced by draft-davis-ccamp-photonic-plugin-control-arch

6. Architectural Requirements to Achieve full Automation in Packet over Optical Converged Networks	18
6.1. R1: There shall be a "single functional entity" responsible for optical services life cycle management	19
6.2. R2: There shall be a clear distinction between functional components of optical control vs. its realization	19
6.3. R3: Existing operational practices shall be supported	21
6.4. R4: Various existing YANG Data Models shall be accommodated	21
6.5. R5: Holistic control of optical network shall follow clear demarcation	21
6.6. R6: Higher level controller shall be optional	22
6.7. R7: Urgent optical control actions shall be supported in a timely manner	22
6.8. R8: The solution shall minimize fragmentation of optical parameter provisioning	22
6.9. R9: Access to the coherent plug properties shall be as transparent as possible	22
6.10. R10: Network information shall take direct path to relevant controller	22
6.11. R11: Multi-layer operational benefits shall be addressed	22
6.12. R12: Coherent plug telemetry data shall be collected	23
6.13. R13: Mix of plugs and Transponders/Muxponders (inc. Regens) shall be supported	23
6.14. R14: Optical deployments with protection/restoration shall be supported	23
6.15. R15: Evolution to expected future controller deployment approaches shall be supported	23
6.16. R16: Evolution to future packet processing deployment approaches	23
6.17. R17: The solution shall address both "greenfield" and "brownfield" networks	23
6.18. R18: The control architecture shall be extensible	23

To achieve full automation of Packet over Optical, section-6 of draft introduces a group of requirements.

A few notable requirements:

- **R1:** Single functional entity for Optical services life cycle management
- **R2:** Optical controller functional vs. its realization
- **R3:** Support existing operational practices
- **R6:** Higher-level controller shall be optional
- **R13:** Support for mix of plugs, transponders
- **R17:** Support both Greenfield & Brownfield

Notes

- Options-1 and -2 are valid options for control of packet over optical networks
 - Option-3 **complements** these two options
- Option-3 provides another options for Operators if they decide to deploy them
- **Inter-operatable** Consideration
 - i.e., Operator shall decide to deploy one option. For example, they cannot deploy Option-1 for half of their network and Option-2 for the rest.
- Note that Options-1, 2 and 3 possess shared features:
 - Option-1 and -2 are similar from configuration of pluggables. Different from Assurance
 - Option-1 and -3 are similar from Assurance point of view. Different from configuration

Next Step

- Further reviews are welcome
- In our view, there are two potential solutions:
 - **Solution 1)** Combine the two drafts (which contains all 3 options)
 - **Solution 2)** Keep 2 drafts separate and introduce a new framework draft
i.e., third overarching framework draft that covers requirements and brings the two existing drafts together
- Asking for WG Adoption

Thank You !