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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• Sergio Belotti (Nokia)
In both cases, there a single IP link between Routers R1 and R2

[Gray Optics + Transponders] are replaced with Pluggables inside Routers
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

Packet Network + Pluggables

Packet Controller (e.g., P-PNC)

Higher layer Controller (e.g., MDSC)

Optical Controller (e.g., O-PNC)

R/W for Plugs and Routers (Config)

R/O for Plug Assurance

Optical Network

Option - 1

Packet Network + Pluggables

Packet Controller (e.g., P-PNC)

Optical Controller (e.g., O-PNC)

R/O for Plug Assurance

Higher layer Controller (e.g., MDSC)

Optical Network

Option - 2

CCAMP meeting @ IETF 118 Prague
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-to-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

See Network Configuration Access Control Model
RFC 8341
Requirements introduced by
draft-davis-ccamp-photonic-plug-control-arch

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

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
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<tbody>
<tr>
<td>6.1. R1</td>
<td>Single functional entity for Optical services life cycle management</td>
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<tr>
<td>6.2. R2</td>
<td>Clear distinction between functional components of optical control vs. its realization</td>
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<td>6.3. R3</td>
<td>Existing operational practices shall be supported</td>
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<td>6.4. R4</td>
<td>Various existing YANG Data Models shall be accommodated</td>
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<td>6.5. R5</td>
<td>Holistic control of optical network shall follow clear demarcation</td>
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<td>6.6. R6</td>
<td>Higher level controller shall be optional</td>
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<td>6.7. R7</td>
<td>Urgent optical control actions shall be supported in a timely manner</td>
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<td>6.8. R8</td>
<td>The solution shall minimize fragmentation of optical parameter provisioning</td>
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<td>6.9. R9</td>
<td>Access to the coherent plug properties shall be as transparent as possible</td>
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<td>6.10. R10</td>
<td>Network information shall take direct path to relevant controller</td>
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<td>6.11. R11</td>
<td>Multi-layer operational benefits shall be addressed</td>
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<td>6.12. R12</td>
<td>Coherent plug telemetry data shall be collected</td>
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<td>6.13. R13</td>
<td>Mix of plugs and Transponders/Muxponders (inc. Regens) shall be supported</td>
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<td>6.14. R14</td>
<td>Optical deployments with protection/restoration shall be supported</td>
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<td>6.15. R15</td>
<td>Evolution to expected future controller deployment approaches shall be supported</td>
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<td>6.16. R16</td>
<td>Evolution to future packet processing deployment approaches</td>
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<td>6.17. R17</td>
<td>The solution shall address both “greenfield” and “brownfield” networks</td>
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<tr>
<td>6.18. R18</td>
<td>The control architecture shall be extensible</td>
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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 !