

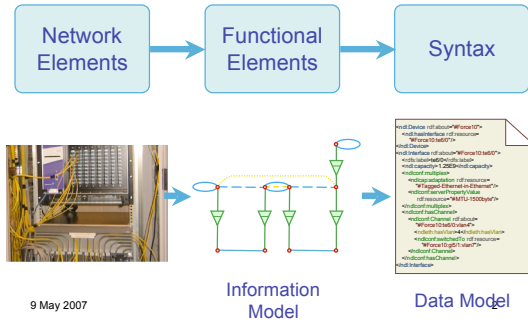
Thoughts on Network Modeling

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Model versus Syntax



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Existing Models

Information Models:

- Graph Theory
- ITU-T G.805 (functional elements)
Originally for network connections, but extended to describe networks

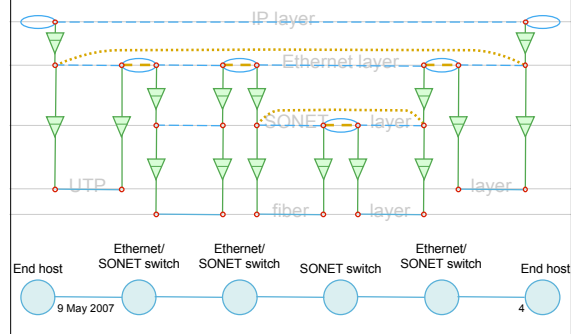
Data Models:

- GMPLS: switching based on labels
- CIM: describe access networks asset management

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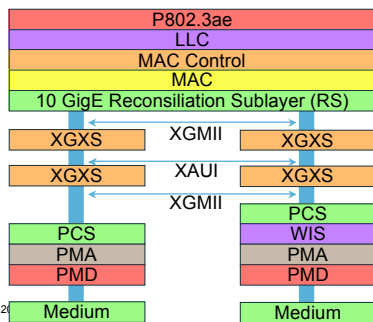
Layer schema based on G.805



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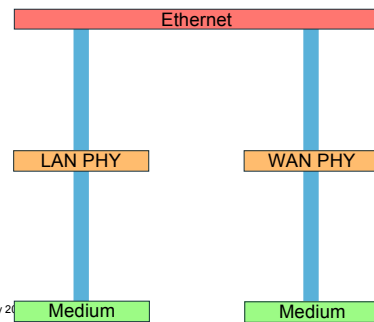
Describe All Layers?



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Or Only Possible Incompatibilities?



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Why Multi-layer NDL?

- Target applications:
 - Visualization
 - Path finding
(find incompatibilities. E.g. conflicting wavelengths, different adaptation, incompatible MTU sizes)
 - Fault isolation
(required network connection description)

The last two items require multi-layer network descriptions.

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Multi-Layer NDL

- Layer schema is used to describe technologies
(thus does not describe technologies itself)
- Flexible
(can describe technologies in multiple ways)

Non-goals:

- Packet networks (MAC, IP): describes those as large broadcast networks (not true for IP)
- Physical properties: very limited concept of regeneration
- But: can be included with other schemas (that's the strength of RDF)

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Technologies

Test cases for the layer schema:

- IP layer
- Ethernet (MAC + LAN/VLAN layers)
- ATM (AAL5/VCI + VPI (NNI/UNI) + cell layers)
- SONET/SDH (15 (!) layers as RFC 4606)
- WDM (Lambda + Fiber layers)
- Copper (UTP) layer
- Bundle layer (multiple fibers in a single duct)

And even: PPP, MPLS, L2TP, 802 Wireless

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Applications in Development

- Configuration of devices
- Path Walk (given an end-point, find the destination)
- Fault Isolation
- Path Finding (must be a combination of topology, technology constraints, policy and scheduling/reservation)

<http://ndl.uva.netherlight.nl/>

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