Applicability of RFC8795 YANG data model to SIMAP

NMOP WG, IETF 126, Vienna

draft-busi-nmop-simap-rfc8795-applicability-02

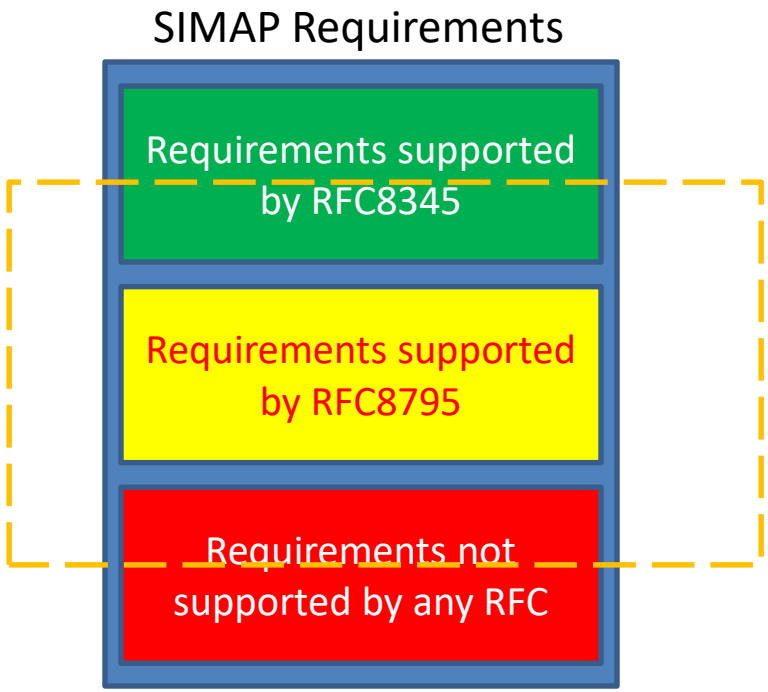
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Motivation

- Analyze the applicability of the RFC 8795 YANG data model to Service & Infrastructure Maps (SIMAP)
  - Some SIMAP requirements already supported by RFC 8795
  - Other SIMAP requirements would require extensions
- RFC 8795 defines a topology model which supports
  - multi-layered topology
  - navigation and correlation among layers
  - applicable to multiple domains and technologies
- The TEAS WG draft on TE topology profile clarifies that the model can be profiled for non-TE applications
  - This draft focuses on SIMAP specific applications

Additional clarifications

- Not all the SIMAP requirements can be met by RFC8795
- Different opinions on
  - Whether to re-use RFC8795 or develop a new YANG data models for the requirements already supported by RFC8795
  - The split between the three types of requirements (e.g., whether bidirectional links are or not supported by RFC8345)

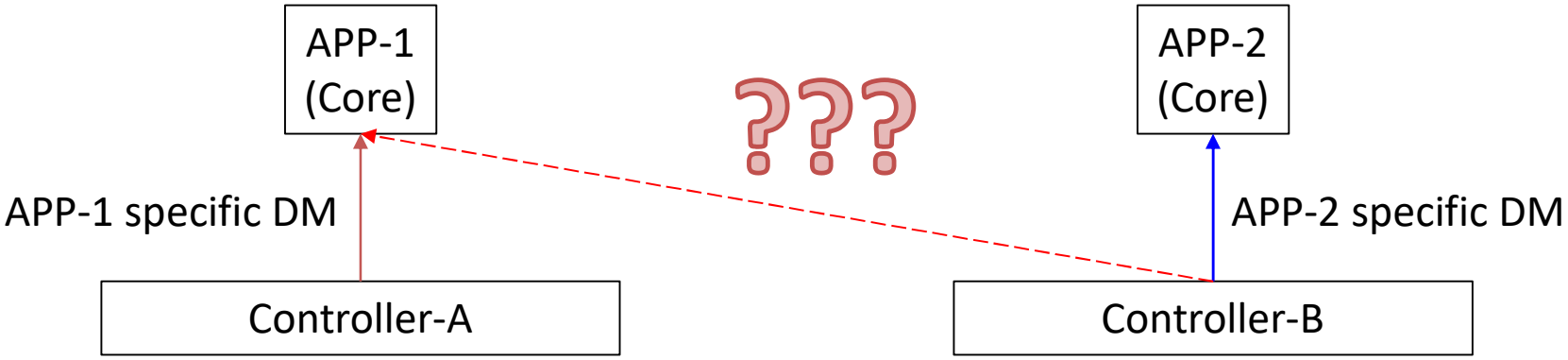


Content

- Initial applicability and gap analysis
  - Bidirectional Links
  - Multipoint Links
  - Links and nodes down
  - Multi-layer topology navigation
  - Multi-domain links
  - Other requirements to be analyzed in future versions
- Considerations for “programmatic” profiling
  - Implementations exist based on manual pruning/profiling of the YANG tree (see details in the TEAS WG draft on TE topology profile)
  - Deviation statements can be used to automatically generate a pruned/profiled YANG tree
  - More discussions needed to understand the real need

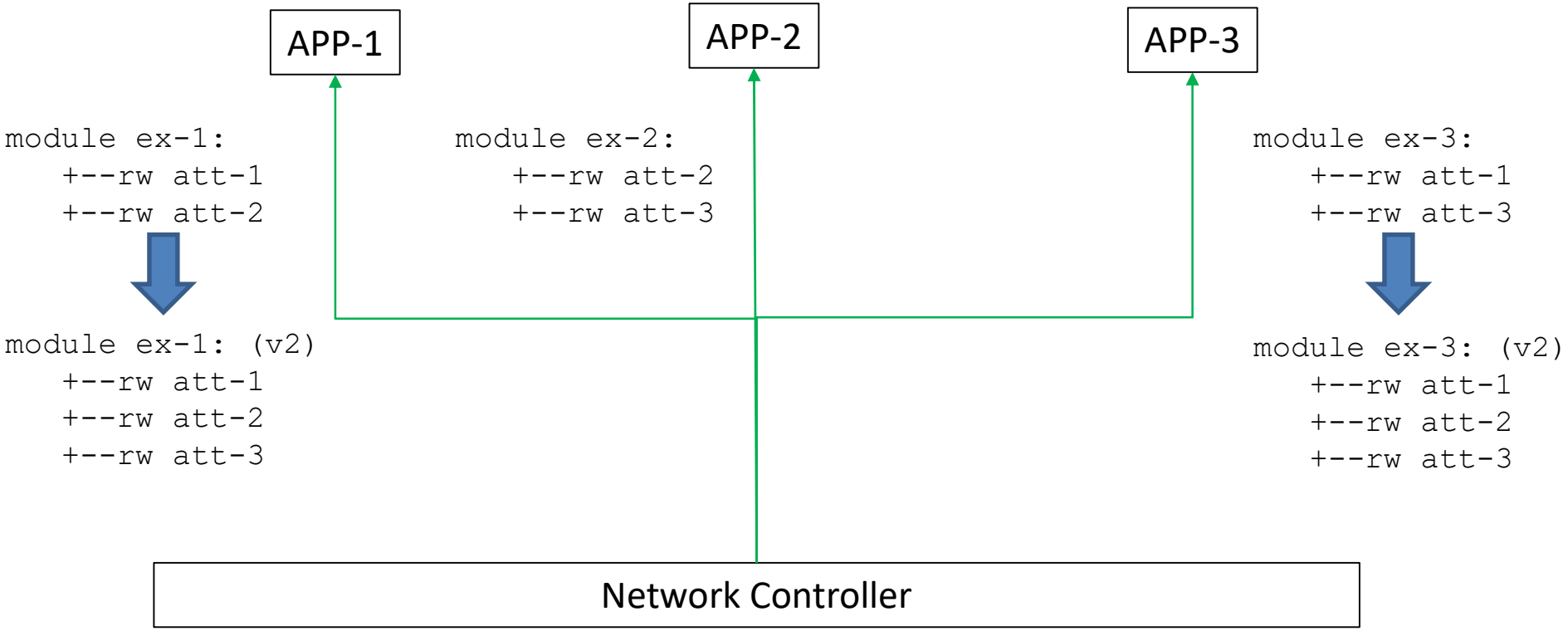
Note: this I-D is a follow-up of the presentation at 2024-NMOP-01 WG Interim Meeting:
https://datatracker.ietf.org/meeting/interim-2024-nmop-01/materials/slides-interim-2024-nmop-01-sessa-applicability-of-te-topology-data-model-to-digital-map-01.pdf

Design considerations



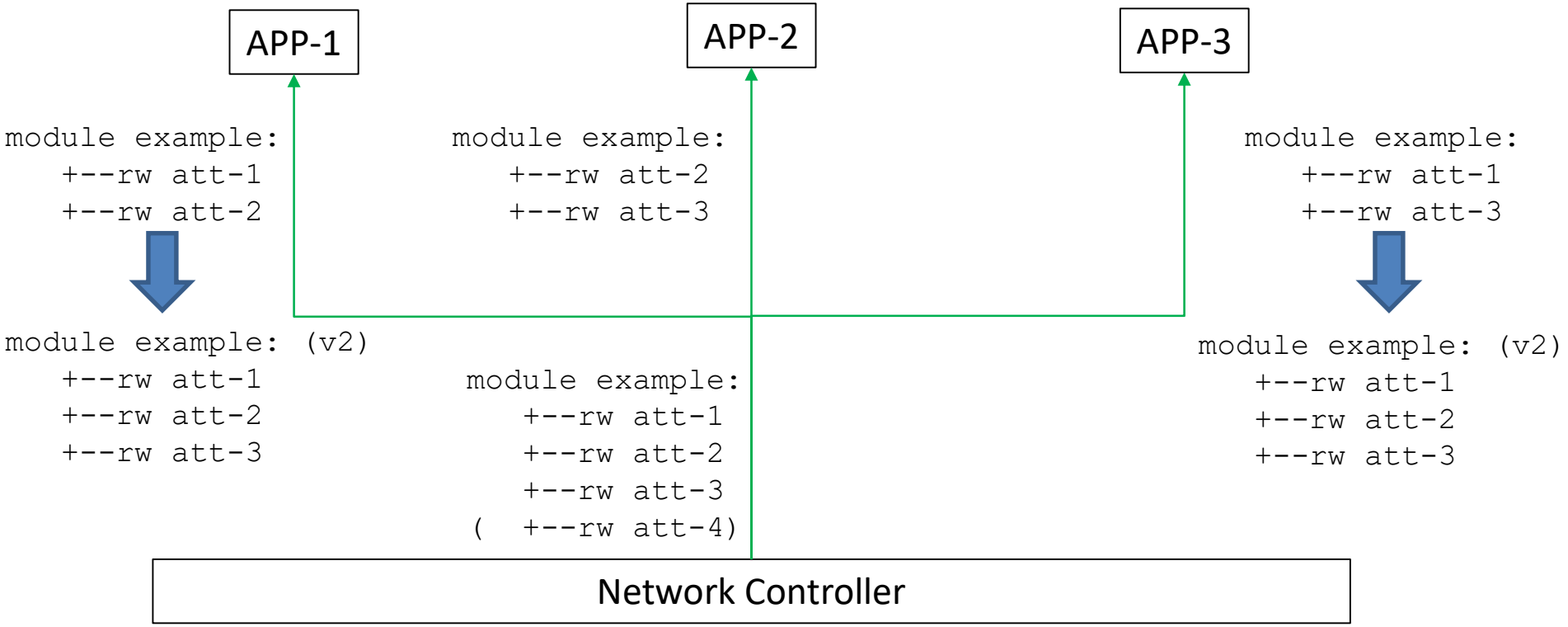
- Multi-vendor integration issues
  - APP-1/controller-A and APP-2/controller-B becomes isolated “silos”
- Need for the operators to negotiate with the vendor and controller vendors customized solutions before integrating a new application or a new controller in the network
- This was the issue SDN was intended to address to remove the existing multi-vendor interoperability issues and network silos
- Do we need different models to report the delay and bandwidth of a link depending on whether this information is used for path computation (TE application) or other applications?

Issues without profiles



- Need to implement multiple modules providing multiple copies of the same information
- Multiple modules can become identical just following different evolution paths

How profiles can help



- How to define them?
- How can the network controller report what has been implemented?
- Some attributes may not be required by the application or not applicable to the network scenario

Lesson learnt in other WGs

- Standardized YANG data models are necessary but not sufficient to achieve multi-vendor interoperability
  - Different people interpret and use the YANG data model constructs differently
  - Different implementations can implement the same YANG data model differently to support the same use cases
    - Sometimes this approach lead to the identification of different gaps
- Developing applicability statements to provide common guidelines on the use standardized YANG data models for different use cases is key to achieve multi-vendor interoperability and identify gaps
  - Transport NBI in CCAMP WG for multi-domain optical networks
  - ACTN Packet Optical Integration (POI) in TEAS WG
- BUT
  - Mixed feeling about the interest/push toward this type of work
  - Requires a lot of efforts (and sometimes many pages)
  - Developing application-specific YANG data models for specific use cases requires lower efforts

Work done after IETF 125

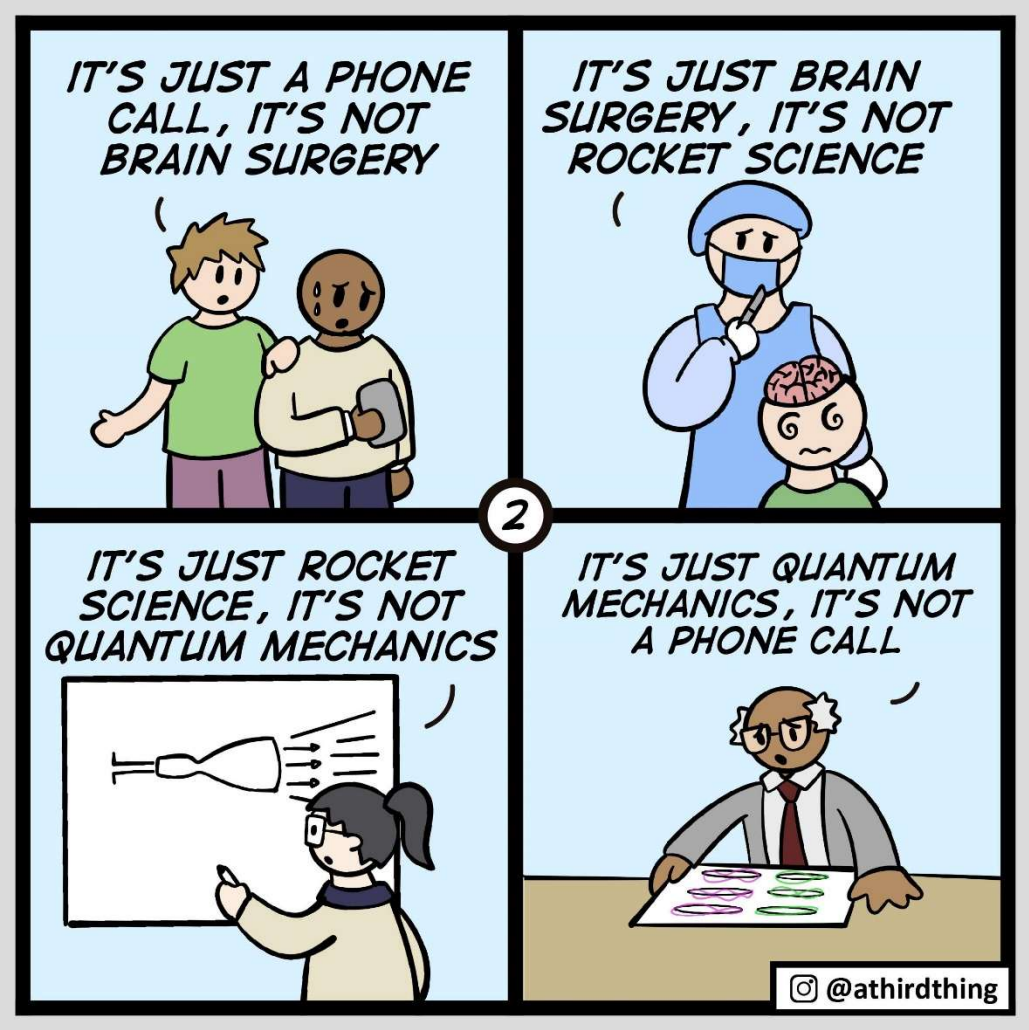
- Detailed comparison of the two proposals on a selected sub-set of SIMAP requirements
  - REQ-BASIC-MODEL-SUPPORT
  - REQ-LAYERED-MODEL
  - REQ-LAYER-NAVIGATE
  - REQ-SEMANTIC
  - REQ-SUPPORTING
- See next slides for some individual considerations after this detailed comparison

See: https://github.com/ietf-wg-nmop/Misc/blob/main/SIMAP-Model-Analysis/Olga's%20and%20Italo's%20proposal.xlsx

Individual Considerations

- Why defining new topological elements is an issue?
  - Common view that RFC8345 “supporting” relationships are not sufficient to model multi-layer navigation
  - The path and path elements have been defined for this purposes
    - Addressing requirement from multiple technologies (packet and optical)
    - Path element has be extended with technology-specific elements such as optical transceiver and 3R regenerators elements
  - Connectivity matrix has been introduced to model connectivity limitations within a node or pseudo-node
  - Tunnel termination points have been introduced to model the resources needed for layers transition
  - TE tunnels exist in TE networks and may support links in the client layer
    - The model does not preclude using the underlay path also in case the link is supported by a TE tunnel: just requiring the controller to maintain duplicated information
- The issues appear just a preference for a different modelling approach (simple)
  - Better to have them discussed during the development of RFC8795

What is simple?



Individual Considerations (2/3)

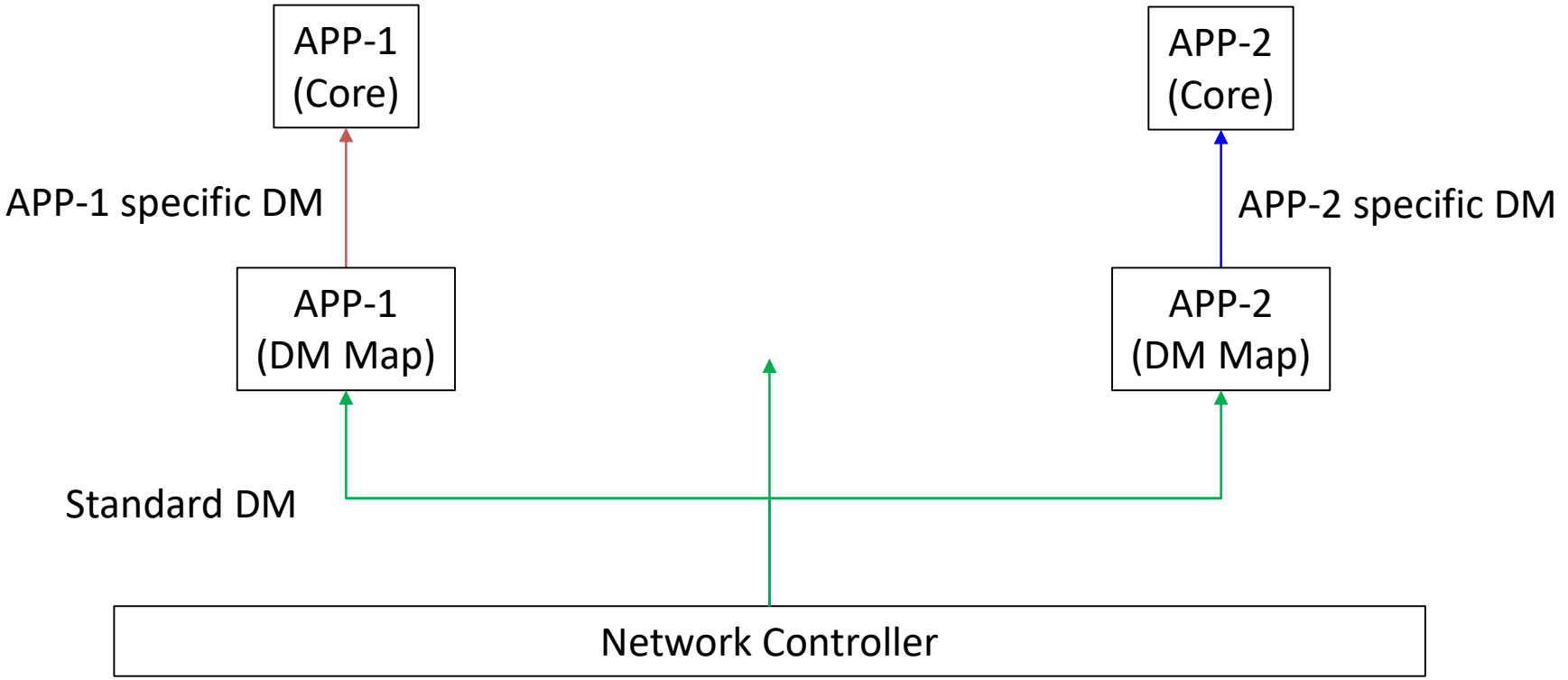
- Do SIMAP applications require only a sub-set (profile) of RFC8795 or may also require full-blown RFC8795?
  - From draft-ietf-nmop-simap-concept-12: “The use cases for capacity planning, simulation, network simulation and network emulation, closed loop, and potentially others, should consider TE if configured in the network”
- Do we need a single profile for all SIMAP the applications or different application-specific profiles?
- What is the issue with profiling RFC8795?
  - Existing implementations and deployments support a sub-set of RFC8795
    - Manual pruning of the YANG tree has been used in multiple PoCs and plug-tests
  - Deviation statements cannot be standardized also because if an attribute is not needed by one application (profile) it might be needed by another application (profile) to be supported by the same network controller
    - This draft explore the possibility to use deviation statements instead of manual pruning of the YANG tree to support Hackathons, PoCs and plug-tests

Individual Considerations (3/3)

- Possible options to make RFC8795 more modular (RFC8795-bis)
  - Split RFC8795 into multiple modules
    - Addresses “marketing” issues: misperception about complexity or applicability only to TE networks
    - Requires NBC changes to RFC8795 (different namespaces)
    - Is the marketing value worth the technical effort?
  - Define new network types and when statements
    - For example: a new network type for topologies which needs multi-layer navigation
    - These changes to RFC8795 are BC
    - Might not fully address the “marketing” issue
      - TE remains in the namespace and attributes names
      - YANG tree remains unchanged (long)
      - YANG code becomes even longer and more complex
  - Technical efforts look similar: need discussion with TEAS WG

Backup

Design considerations (2)



Design considerations (3)

