Challenge: Network Digital Twins –

Practical Considerations & Thoughts

draft-liest-nmrg-challenges

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Background

- NDTs gain traction –
  Past discussion within and outside of the IETF on NDT (wireless, transport, mobile core, ..smart city)

- Draft discusses practical aspects and challenges when designing and operating a NDT

- Draft discusses R&D and practical experiences from a Software-defined NDT (SDNDT)

- Complement the group‘s NDT Use Cases and Architecture document

Content

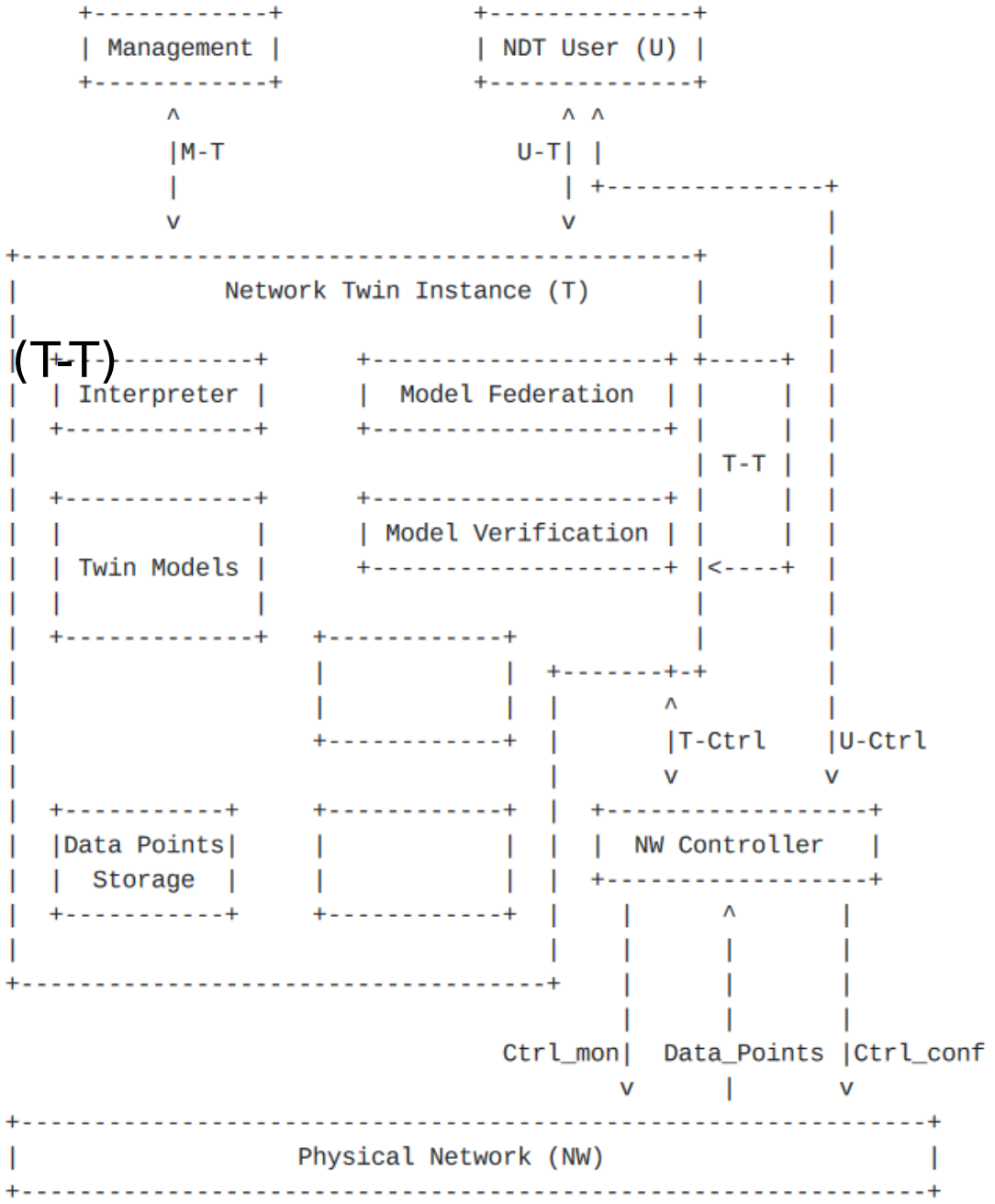
- Assumptions & Challenges
  - NDT awareness (network and its abstraction, data points collection, ..)
  - Applying models
  - Probes vs. Enforcements (abstractions, Intent vs. NDT user controlled)
  - Scale and accuracy (node diversity, data points volume, data points transmission latency)
  - NDT user diversity and parallelism (interference)

- NDT functional elements and reference points
  - Discussed in the view of challenges

- Software-defined Network Digital Twin
  - Implementation, Discussion, Lessons learned

NDT Instance particularities

- NDT OAM (M-T)
- Distributed Deployment & Model Federation (T-T)
- Model Verification
- Shared Network Controller
- NBI semantic interpreter & resolver

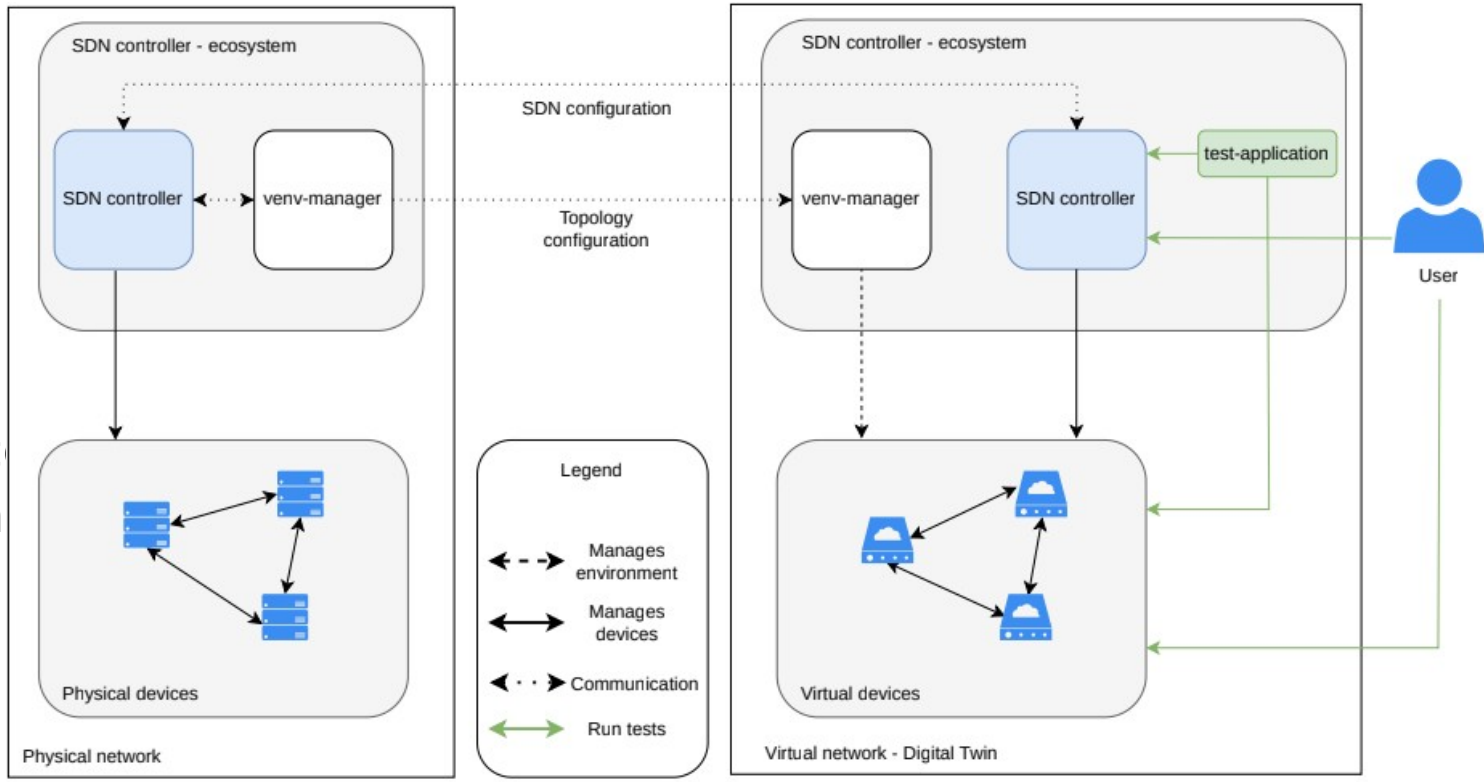


R&D on Software-Defined NDT

- Information handling per se
  - extract information about the current state of the physical network
  - feed back changes from the NDT to the physical network
- Distinguish between 2 (extreme) types of NDTs for first steps
  - **Static Test System**: snap-shot based
  - **Live Reacting System**: real-time closed-loop synchronization between physical and NDT
- Overall goal: find first tangible experiences with implementation
  - NB: without limiting further exploration and research
- Number of questions/challenges (some of them ;-)
  - Interface to devices and representation of device information
    - the “usual” challenges of network management
  - Granularity: Which information and in what time resolution
  - Conflicting changes out of the NDT

Software-Defined NDT Implementation

- Static Test System
  - Snap-Shot
  - Work in NDT
  - Pushback on demand
- Implementation
  - venv-manager for Topo. Conf
  - goSDN controller for detailed c
  - Containerlab as virtual environ
  - Interfacing to network devices
    - gNMI
    - Openconfig Yang model set
  - Tests with
    - Arista EOS
    - Own gnmi-target/Linux



Visit the goSDN project https://www.netellyfish.org