Reliable and Available Wireless Architecture

Contribution to DetNet WG

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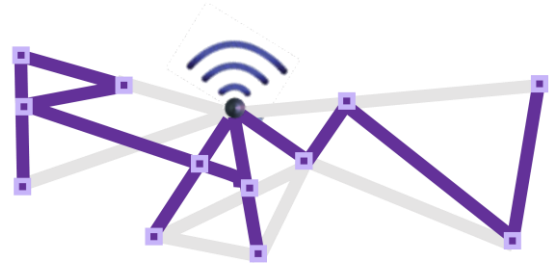
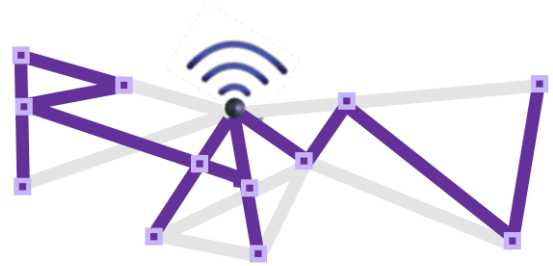
Vs RAW framework



- The idea at RAW was to document
  - the architecture as the intention (structuring what we will do)

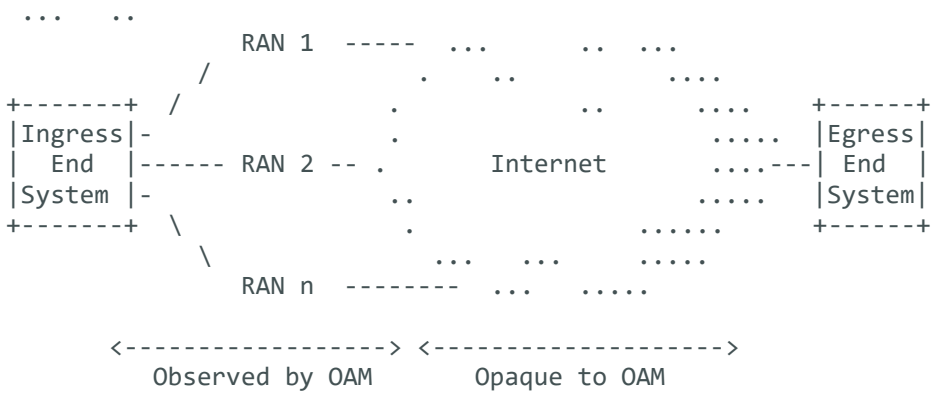
    and
  - the framework as the realization (how we did it)
- Way to go
  - Publish the RAW Architecture (appears ready)
  - Start updating the framework to track the progress

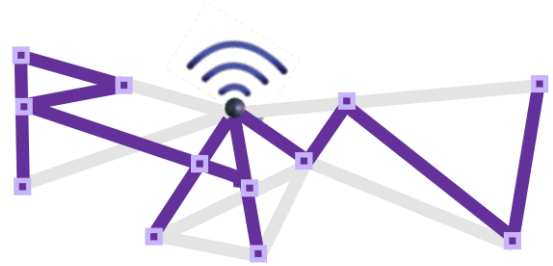
18 published



- Clarifications (Janos ‘ discution)
- Rescoping to fit in DetNet Charter

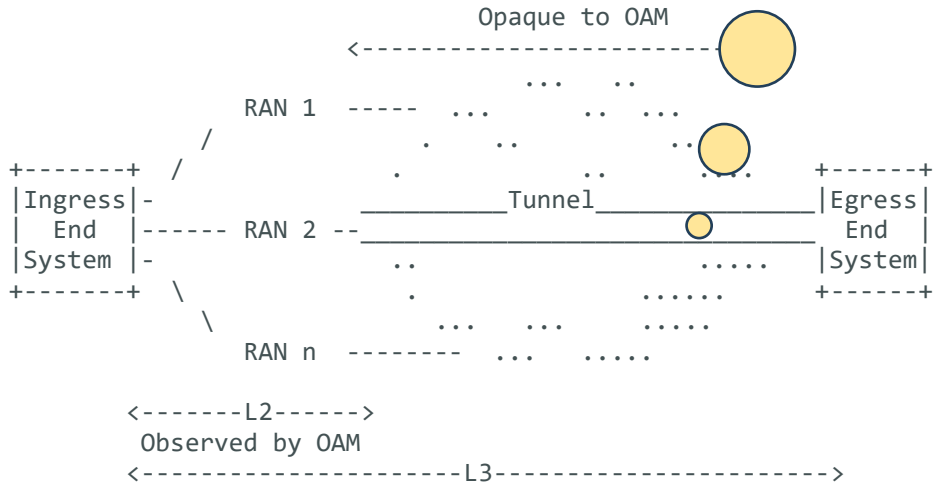
Rescoping



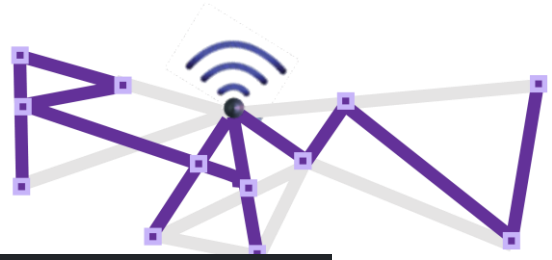


Note:
Should we have more tunnels on this figure to illustrate multipath?

- Removed ‘Internet’
- Focus on the Tunnel that can be measured
- Possibly extends classical DetNet application

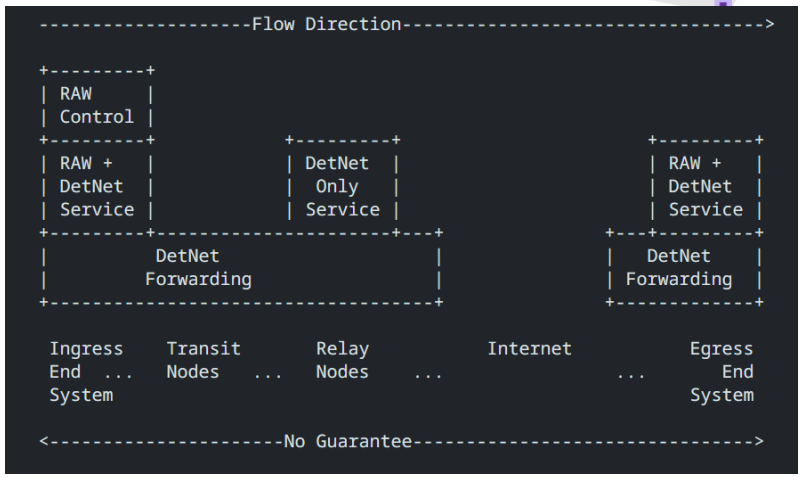


Rescoping (2)

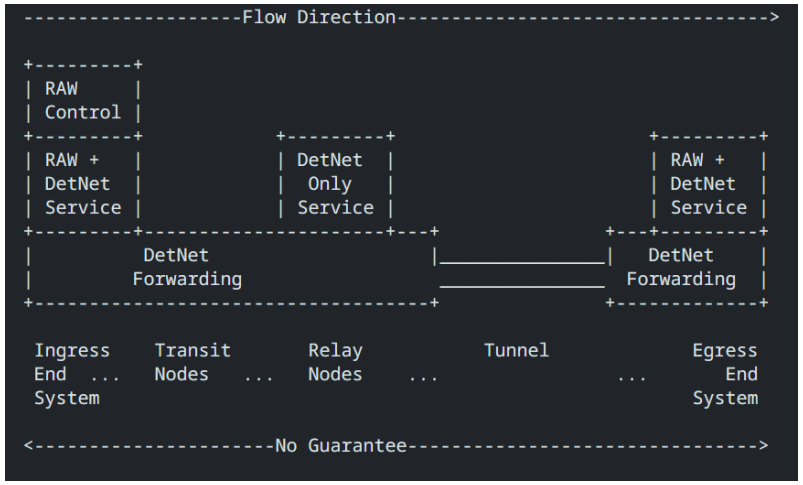


* The recovery graph may be strict, meaning that the DetNet forwarding sub-layer operations are enforced end-to-end

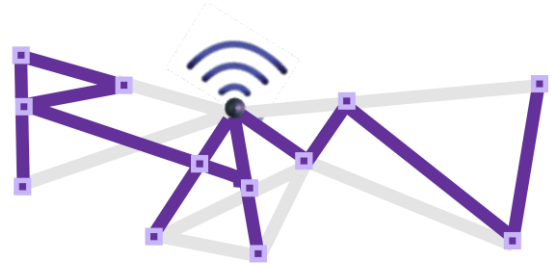
* The recovery graph may be expressed loosely to enable traversing a non-RAW subnetwork as in Figure 7. In that case, RAW can not leverage end-to-end DetNet and cannot provide latency guarantees. The non-RAW subnetwork is neglected in the RAW computation, that is, considered jitterless, and infinitely reliable and/or available in comparison with the links between RAW nodes, so loss and jitter that is measured end-to-end is attributed to the RAW hops (typically an access link).



- Text in green elided (intent was Wi-Fi ESS or core)
- Considers tunnels over unspecified domain



Timing orders



	rCPF	PLR (In Scope)
Operation	Typically Centralized	Source-Routed or Distributed
Communication	Slow, expensive	Fast, local
Time Scale	hours and above	seconds and below
Network Size	Large, many recovery graphs to optimize globally	Small, within one recovery graph
Considered Metrics	Averaged, Statistical, Shade of grey	Instant values / boolean condition

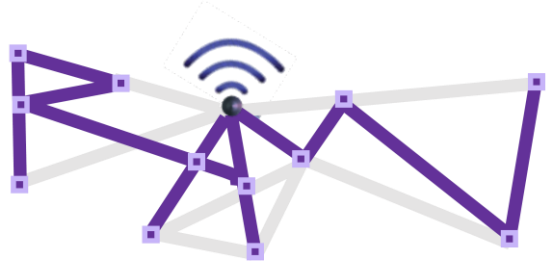
Table 1: CPF vs. PLR

- IOT networks time scale could be very slow
- Retained the orders of magnitude ratio
- But moved to more classical time scales

	rCPF	PLR (In Scope)
Operation	Typically Centralized	Source-Routed or Distributed
Communication	Slow, expensive	Fast, local
Time Scale (order)	routing computation + round trip, milliseconds to seconds	lookup + FIB installation, micro to milliseconds
Network Size	Large, many recovery graphs to optimize globally	Small, within one recovery graph
Considered Metrics	Averaged, Statistical, Shade of grey	Instant values / boolean condition

Table 1: CPF vs. PLR

Summary of Other Updates

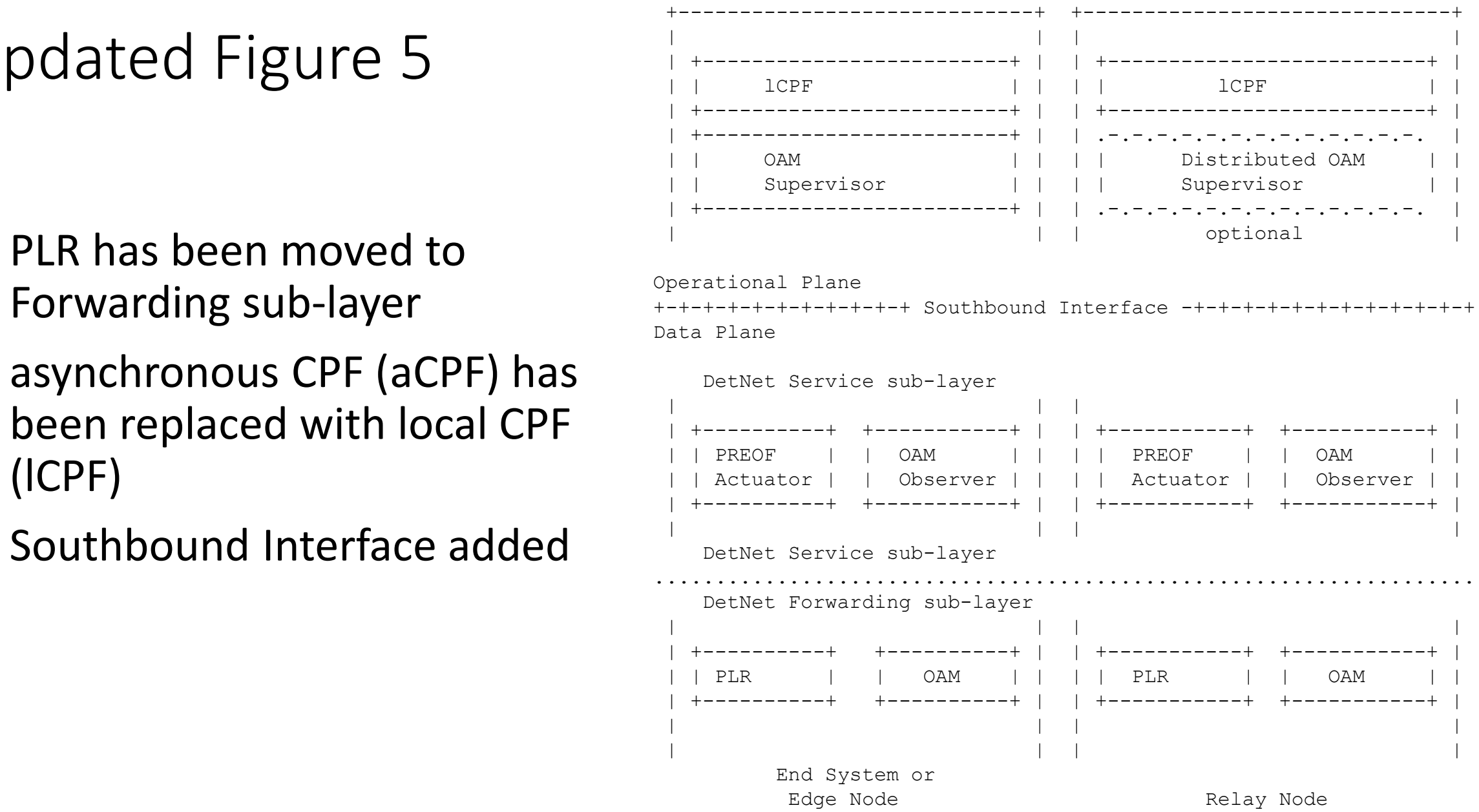


- Main purpose of the updates is a better integration of RAW within the DetNet umbrella
- Removed references to Internet, but still include tunnels that can be observed by OAM
- Updates to Figure 5 and corresponding text to bring them in-line with Figure 3 added to v17
- Nits

- detailed proposals in emails
  - Figure 5 and corresponding updates, and further fixes
  - updates to the definition of Reliability and Availability
- for further details, see the diff between v17 and v18 and summary mail

Updated Figure 5

- PLR has been moved to Forwarding sub-layer
- asynchronous CPF (aCPF) has been replaced with local CPF (lCPF)
- Southbound Interface added



Suggested New Definitions

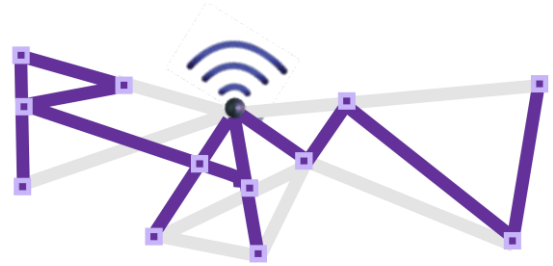
- 2.5.4. Reliability

Reliability is a measure of the probability that an item (e.g., system, network) will perform its intended function with no failure for a stated period of time (or number of demands or load) under stated environmental conditions. In other words, reliability is the probability that an item will be in an uptime state (i.e., fully operational or ready to perform) for a stated mission, e.g., to provide an SLA. See more in [NASA1].

- 2.5.5. Availability

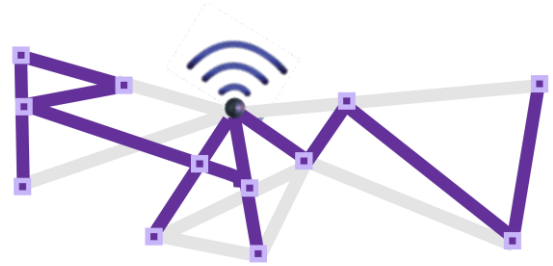
Availability is the probability of an item's (e.g., a network's) mission readiness (e.g., to provide an SLA), an uptime state with the likelihood of a recoverable downtime state. Availability is expressed as (uptime)/(uptime+downtime). Note that it is availability that addresses downtime (incl. time for maintenance, repair, and replacement activities) and not reliability. See more in [NASA2].

Further Updates



- Maximum Consecutive Failures (MCF) replaced with Maximum Consecutive Loss (MCL) as per RFC 9016

Next Step



- 2nd WGLC