

Requirements of Layer 3 Deterministic Latency Service

[draft-geng-denet-requirements-bounded-latency-03](#)

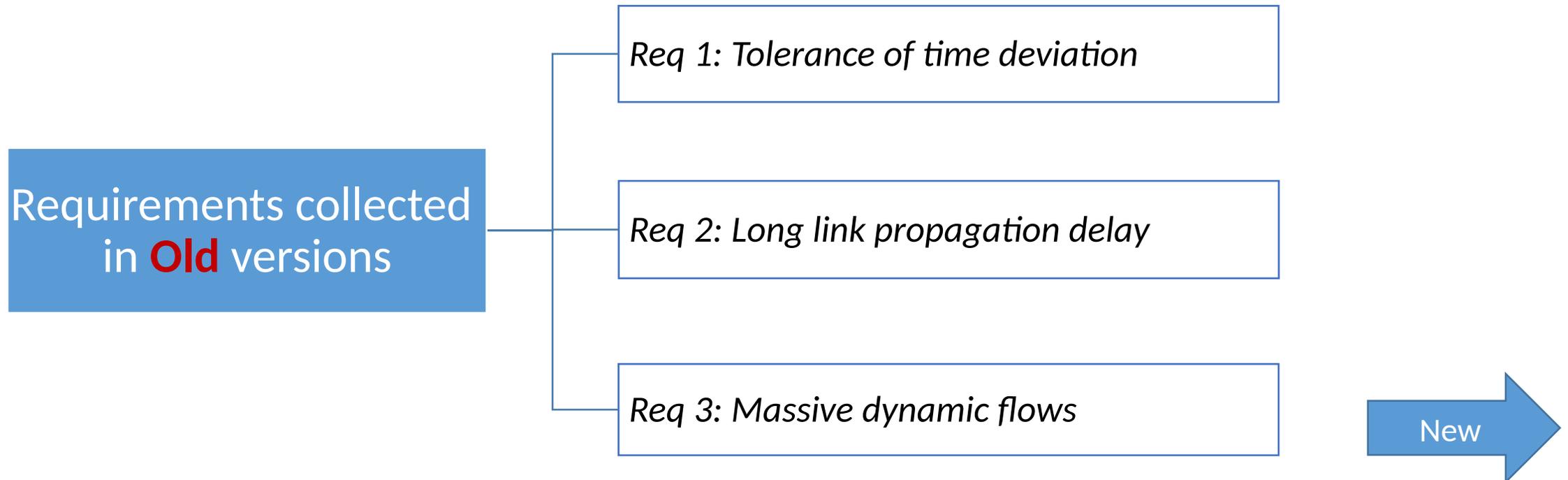
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Reminder

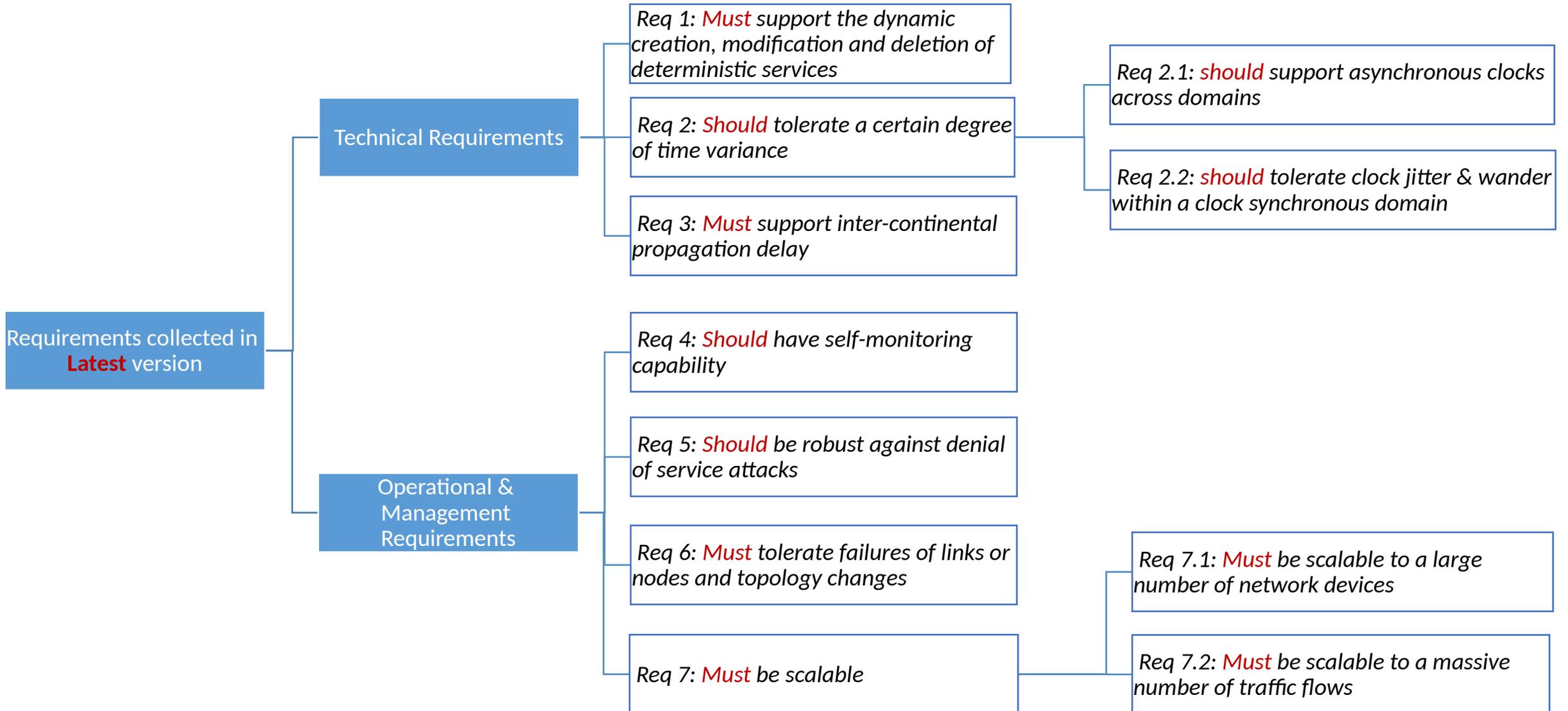
- Specify requirements of deploying deterministic latency service on layer 3 networks from the perspective of the service providers
- Not define/recommend any specific solution
- Use as justification and reference for normative work in DetNet or other relevant WGs

Major Changes from IETF 104

- **More requirements** have been collected from **more operators**
- Categorized requirements into **optional and mandatory**



Requirements Collected in Latest version

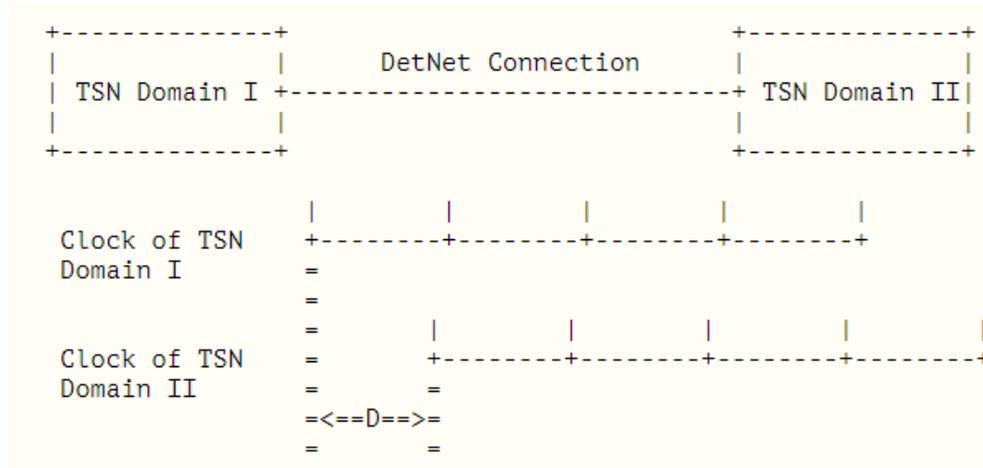


Req 1: **Must** support the dynamic creation, modification and deletion of deterministic services

- Many DetNet applications are expected to running on a service provider's network simultaneously, and different DetNet applications may have different lifecycles and SLA requirements, hence the network state will always change dynamically
- DetNet **must** guarantee the dynamic creation, modification and deletion of deterministic services will **not affect any deterministic services that are already running in the network**
- A mechanism is **un-applicable** if it **relies on a stable network state** for global computing, any change in network state will lead to re-computing

Req 2: **Should** tolerate a certain degree of time variance

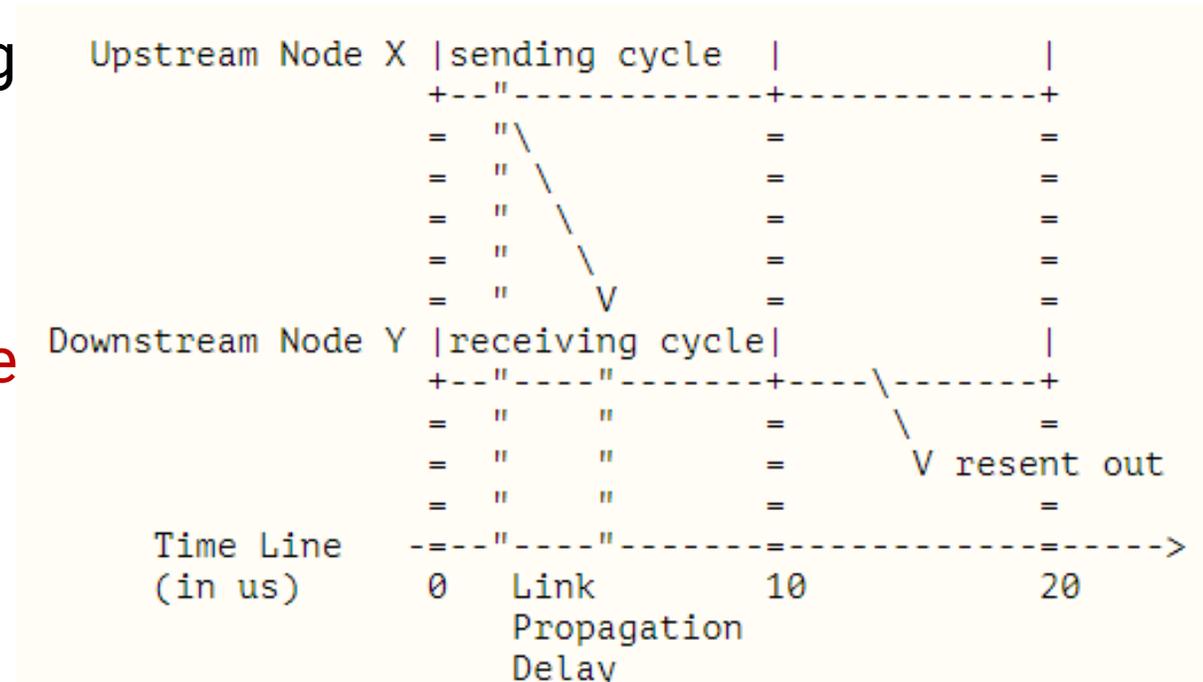
- Req 2.1: should support asynchronous clocks **across domains**



- Req 2.2: should tolerate clock jitter & wander **within a clock synchronous domain**
 - ✓ Crystal oscillator – 100 ppm
 - ✓ SyncE – 50 ppb
 - ✓ More precise time synchronization in 5G mobile backhaul

Req 3: **Must** support inter-continental long link propagation delay without sacrificing determinacy

- Long link propagation delay may cause some troubles to cyclic forwarding type mechanisms which require packets can only be sent/received at **specific time cycles**
- In the example shown in figure, sending cycle of upstream node and receiving cycle of downstream node correspond to the same period of time. In order to support long link propagation delay, **the length of cycle** need to be set to **larger value**
- Since packets will vary within receiving cycle, longer cycle means **larger jitter**



Req 4: **Should** have self-monitoring capability

- Both network operators and end-users need to be able to measure if the deterministic latency service is working correctly and meeting its SLA
- Network operators can input the collected results into a reporting system and produce the latency (and jitter) distribution over a period of time, which would be helpful for operators in understanding their networks
- Since fine-granularity monitoring is **costly**, self-monitoring is **not**

Req 5: **Should** be robust against denial of service attacks recommended as a mandatory requirement until the use-cases are clear

Req 6: **Must** tolerate failures of links or nodes and topology changes

Req 7: **Must** be scalable

- Req 7.1: must be scalable to a large number of **network devices**
 - ✓ A simple use case to understand is ultra-low-latency (public) 5G transport networks, which would require DetNet extend to every 5G base station
 - ✓ **~100 K** base stations, or even more in some operators' networks
- Req 7.2: must be scalable to a massive number of **traffic flows**
 - ✓ If each ultra-low-latency slice is treaded as a DetNet traffic flow
 - ✓ And each base station has a limited number of ultra-low-latency slices (~10)
 - ✓ Then, **~1M** (10 slices per base station* 100 K base stations) DetNet traffic flows co-exist

In Summary

- Want to make sure requirements are well understood through draft
 - And verify that DetNet WG agrees on requirements being valuable
- Call for WG Adoption?

Thank you