

Requirements of large-scale deterministic network

draft-liu-detnet-large-scale-requirements-05

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Recap and Motivations

Recap

Presented the requirements slides in **Detnet** interim, absorbing some good points from the earlier draft

Submitted and presented [draft-liu-detnet-large-scale-requirements-00](#)

Merged [draft-xiong-detnet-wide-area-ip-requirements](#), addressed the comments

Discussion online and offline, addressed the comments and update [from v01 to v05](#)



Motivations

- Aiming at the large-scale deterministic network with long hops, large per-hop time variation, great number of flows and/or multiple domains without the same time source, this document describes the technical requirements including the data plane enhancement requirements when the different deterministic levels of applications co-exist and are transported.

Main Updates

- Summarized the key attributes of large-scale detnet
- Re-structured the document for better alignment:
 - Remove Section 3 of the old version and merged it into Requirements Section
 - Refine the Technical Requirements Section
 - Add Data Plane Enhancement Requirements Section
- Addressed the comments from Lou Berger, Bala'zs Vagas, Fan Yang, Lei Zhou, & Tianran Zhou. Thank you all.
- Some editorial improvement.

Key attributes of large-scale detnet

We define a large-scale DetNet network as a network that requires DetNet solutions for typically one or more of the following key attributes:

- There is relaxed clock synchronization or no clock synchronization in different domains.
- The end to end path is a combination of short and long distance hops.
- There are various transmission rate supported at the different ports and on different network node.
- There are a large number of flows which may has different level demands of DetNet service accrossing multi-domains.
- The topology change and failures of link might be more common.
- The mechanisms used to ensure bounded latency (e.g. queuing mechanism) may be multiple or have different configuration/parameter in multi-domains.

Such domains are normally within a single administrative control network or multiple cooperating administrative networks within a closed group of administrative control [RFC8655].

Overall technical requirements

-closely aligned with the key attributes

- Req 1. Tolerate Time Asynchrony
 - Support Asynchronous Clocks Across Domains
 - Tolerate Clock Jitter & Wander within a Clock Synchronous Domain
 - Provide Mechanisms not Requiring Full Time Synchronization
 - Support Asynchronization based Methods
- Req 2. Support Large Single-hop Propagation Latency
- Req 3. Accommodate the Higher Link Speed
- Req 4. Be Scalable to ~~Numerous Network Devices~~ and Massive Traffic Flows
- Req 5. Tolerate Failures of Links or Nodes and Topology Changes
- Req 6. Support Enhancement of Queuing Mechanisms (merge original Req 6 and Req 7)
 - Support Configuration of Multiple Queuing Mechanisms
 - Support Queuing Mechanisms Switchover Crossing Multi-domain

Data Plane Enhancement Requirements

- **Req 1. Support Aggregated Flow Identification**
 - The number of individual flows is huge, and they may randomly join and leave the aggregated flow at each hop.
 - Explicit flow identification makes it easier to quickly distinguish the different kinds of DetNet flows instead of relying on the prefixes or wildcards as indicated in [RFC8938].
- **Req 2. Support Meta Information used by Functions ensuring Deterministic Latency**
 - Supporting synchronized or asynchronous queuing mechanisms requires different information to be defined as the DetNet-specific metadata
 - Data plane processing efficiency also needs to be considered
- **Req 3. Support Redundancy Related Fields**
 - Sequence number is the only metadata currently defined for redundancy feature of Detnet.
 - MPLS data plane uses Detnet-over-MPLS label stack to carry it, and native IPv6 data plane should be able to carry this information too.
- **Req 4. Support Explicit Path Selection**
 - MPLS label stack can be used for this purpose. IP data plane enhancement is required to support the explicit path selection based on IP source routing or SRv6.

Next step

- It is in the process of the adoption call.
- Please reply to the mailing list before November 18.