DetNet Architecture Updates

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Summary

• This presentation describes the updates made since publication request

• That is, this presentation describes the changes up to v12 compared to v08
  • https://tools.ietf.org/rfcdiff?difftype=--hwdiff&url2=draft-ietf-detnet-architecture-12.txt&url1=draft-ietf-detnet-architecture-08.txt
  • https://tools.ietf.org/rfcdiff?url2=draft-ietf-detnet-architecture-12.txt&url1=draft-ietf-detnet-architecture-08.txt
Terminology Update

• The following updates have been made to avoid confusion with terminology of the Transport Area
  
  • "forwarding sub-layer" instead of "transport sub-layer"
  
  ┌───────────────┬───────────────┐
  │ DetNet Service sub-layer │ FW, UDP, GRE │
  └───────────────┬───────────────┘
  ┌───────────────┬───────────────┐
  │ DetNet Forwarding sub-layer │ IPV6, IPV4, MPLS TE LSPs, MPLS SR │
  └───────────────┬───────────────┘

• "resource allocation" instead of "congestion protection"

Three techniques are used by DetNet to provide these quantities of service:

- Resource allocation (Section 3.2.1).
- Service protection (Section 3.2.2).
- Explicit routes (Section 3.2.3).
Clarifications Related to Congestion Control

- **Text added** to Section 3.1
  “As DetNet flows are assumed to be rate-limited and DetNet is designed to provide sufficient allocated resources (including provisioned capacity), the use of transport layer congestion control [RFC2914] for App-flows is not required; however, if resources are allocated appropriately, use of congestion control should not impact transmission negatively.”

- **Text added** to Section 3.3.2:
  “Note that the sending of App-flows that do not use transport layer congestion control per [RFC2914] into a network that is not provisioned to handle such DetNet traffic has to be treated as a fault and prevented. PRF generated DetNet member flows also need to be treated as not using transport layer congestion control even if the original App-flow supports transport layer congestion control because PREOF can remove congestion indications at the PEF and thereby hide such indications (e.g., drops, ECN markings, increased latency) from end systems.”
Clarifications Related to Congestion Control – Cont’d

• **Text added** to Section 4.3.2:
  “There is no expectation in DetNet for App-flows to be responsive to congestion control [RFC2914] or explicit congestion notification [RFC3168].”

• **Principles behind congestion control related updates:**
  • avoid the introduction of any new term
  • avoid or minimize the use of terms that have been removed
  • improve clarity, e.g., remove "throttling" and replace it with clearer phrasing
Rewrite of Security Considerations and Extension of Privacy Considerations

• **Section 5 Security Considerations** has been rewritten to make it clear what threats are in scope and to be protected against.

• It has been made clear that security considerations for DetNet are described in detail in [I-D.ietf-detnet-security](https://datatracker.ietf.org/doc/html/draft-ietf-detnet-security-00).  

• **Section 6 Privacy Considerations** has been extended to clarify that DetNet “is not expected to directly raise any new privacy considerations”, e.g., the ability for an attacker to use QoS markings as part of traffic correlation/inspection is not new with DetNet.
Clarifications on non-DetNet Nodes and Flows

• **Clarifications added** on non-DetNet nodes
  
  - **Section 1 Introduction**
    
    "QoS requirements of DetNet flows can be met if all network nodes in a DetNet domain implement DetNet capabilities. DetNet nodes can be interconnected with different sub-network technologies (Section 4.1.2), where the nodes of the subnet are not DetNet aware (Section 4.1.3)."
  
  - **Section 4.3.2**
    
    "All nodes in a DetNet domain are expected to support the data behavior required to deliver a particular DetNet service. If a node itself is not DetNet service aware, the DetNet nodes that are adjacent to such non-DetNet aware nodes must ensure that the non-DetNet aware node is provisioned to appropriately support the DetNet service. ...

• **Clarifications on non-DetNet flows**

  - **Section 1 Introduction**
    
    "The presence of DetNet flows does not preclude non-DetNet flows"

  - **Section 4.3.2**

    "unused resource such as link bandwidth can be made available by the DetNet system to non-DetNet packets as long as all guarantees are fulfilled"
Clarifications on Protection against Malfunctioning/Misbehavior

- **Text added to** 3.2.1.1
  “Furthermore, rate limiting, e.g., using traffic policing and shaping functions, e.g., [RFC2475], at the ingress of the DetNet domain must be applied. This is needed for meeting the requirements of DetNet flows as well as for protecting non-DetNet traffic from potentially misbehaving DetNet traffic sources.”

- **Text added to** 3.3.1
  “Starvation of non-DetNet traffic must be avoided, e.g., by traffic policing and shaping functions (e.g., [RFC2475]).”

- **Clarifications in** 3.3.2
  “Furthermore, filters and policers can take actions to discard the offending packets or flows, or trigger shutting down the offending flow or the offending interface.”
Clarifications on Protection against Malfunctioning/Misbehavior – Cont’d

• Text added to 3.3.2

“In particular, sending DetNet traffic into networks that have not been provisioned in advance to handle that DetNet traffic has to be treated as a fault. The use of egress traffic filters, or equivalent mechanisms, to prevent this from happening are strongly recommended at the edges of a DetNet networks and DetNet supporting networks. In this context, the term 'provisioned' has a broad meaning, e.g., provisioning could be performed via an administrative decision that the downstream network has the available capacity to carry the DetNet traffic that is being sent into it.
Clarifications of Definitions and Use of Terms

• Definition of App-flow has been updated:
  “The payload (data) carried over a DetNet service.”

• Definition of DetNet flow definition has been updated:
  “A DetNet flow is a sequence of packets which conform uniquely to a flow identifier, and to which the DetNet service is to be provided. It includes any DetNet headers added to support the DetNet service and forwarding sub-layers.”

• The requirements of different flow types to DetNet nodes has been clarified in Section 4.3.1.

• The definition of the different DetNet node types have been clarified and their use have been updated throughout the document. Definition of DetNet node has been added:
  • “DetNet node
    A DetNet edge node, a DetNet relay node, or a DetNet transit node.”
• Definition of DetNet sub-layers has been extended
  • DetNet forwarding sub-layer
    “DetNet functionality is divided into two sub-layers. One of them is the DetNet forwarding sub-layer, which optionally provides resource allocation for DetNet flows over paths provided by the underlying network.”
  • DetNet service sub-layer
    “DetNet functionality is divided into two sub-layers. One of them is the DetNet service sub-layer, at which a DetNet service, e.g., service protection is provided.”
• Definitions are now in lexicographic order
Clarified Scope

• It has been clarified that the scope of DetNet is a single administrative domain, not the Internet

• Abstract expended

  “This document provides the overall architecture for Deterministic Networking (DetNet), which provides a capability to carry specified unicast or multicast data flows for real-time applications with extremely low data loss rates and bounded latency within a network domain.“

• Introduction extended

  “… DetNet is for networks that are under a single administrative control or within a closed group of administrative control; these include campus-wide networks and private WANs. DetNet is not for large groups of domains such as the Internet. …”
Clarification on Priority Queuing

• Text updated in 3.1
  • In general, a trivial priority-based queuing scheme will give better average latency to a data flow than DetNet; however, it may not be a suitable option for DetNet because of its worst-case latency.
References

• References have been updated

• New references have been added
  • [BUFFERBLOAT]
  • [IEEE802.1AE-2018]
  • [RFC2914]
  • [RFC3168]
  • [RFC4301]
  • [RFC7149]
  • [RFC8033]
  • [RFC8289]
  • [RFC8453]
Smaller Updates

• Further smaller updates have been made to improve clarity and fix nits as explained in the announcement of the revisions
  • v09
  • v10
  • v11
  • v12
Thank you!