

# DetNet Architecture Updates

Norman Finn, Pascal Thubert, Balázs Varga, and **János Farkas**

DetNet WG

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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"**

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| DetNet Service sub-layer | PW, UDP, GRE
+-----+
| DetNet Forwarding sub-layer | IPv6, IPv4, MPLS TE LSPs, MPLS SR
+-----+

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- **"resource allocation" instead of "congestion protection"**

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

- o Resource allocation (Section 3.2.1).
- o Service protection (Section 3.2.2).
- o 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](#)]
- 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.”

# Clarifications of Definitions and Use of Terms – Cont'd

- 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]  
Gettys, J. and K. Nichols, "Bufferbloat: Dark Buffers in the Internet", January 2012.
  - [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!