DetNet
Data Plane Solutions

draft-ietf-detnet-dp-sol-ip-02
draft-ietf-detnet-dp-sol-mpls-02

Bala'zs Varga, Jouni Korhonen, Janos Farkas, Lou Berger,
Andrew Malis, Stewart Bryant

DetNet WG

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DetNet Data Plane
Updates

- IP Data Plane solution: draft-ietf-detnet-dp-sol-ip-02
  - Changes in v02
- MPLS Data Plane solution: draft-ietf-detnet-dp-sol-mpls-02
  - Changes in v02

- Major document structure open issue
  - Interdependent/standalone definitions ⇨ How many data plane documents
- Next steps
  - Update based on today's discussions, finalize documents, WG Last Call

Key Open Issue:
Data plane definition scope

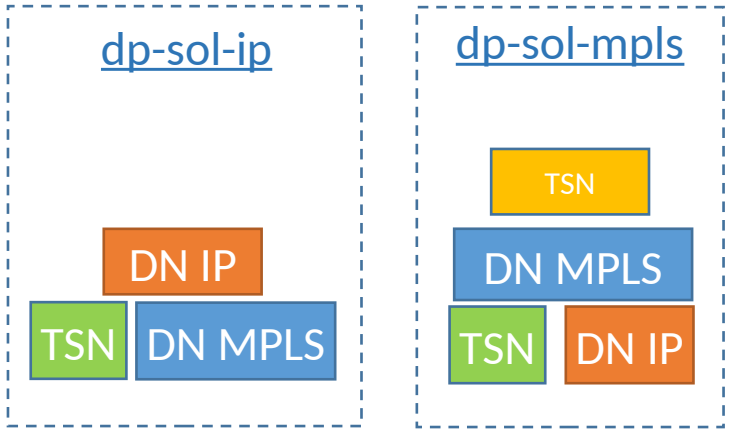
- Basic question: Are we specifying building blocks or a solution?
  - Also translates to how many documents
- IETF generally takes a building block approach to specifications
  - For example: MPLS data plane form is defined (RFC3032) without any description of what is carried in MPLS or how MPLS is carried over any specific technologies
    - Approach has enabled a whole ecosystem not necessarily envisioned at time of definition, e.g., PWs, L1-3VPNs, MPLS over UDP/IP, SR-MPLS, etc
- Other organizations specify solutions
- Current approach has two documents

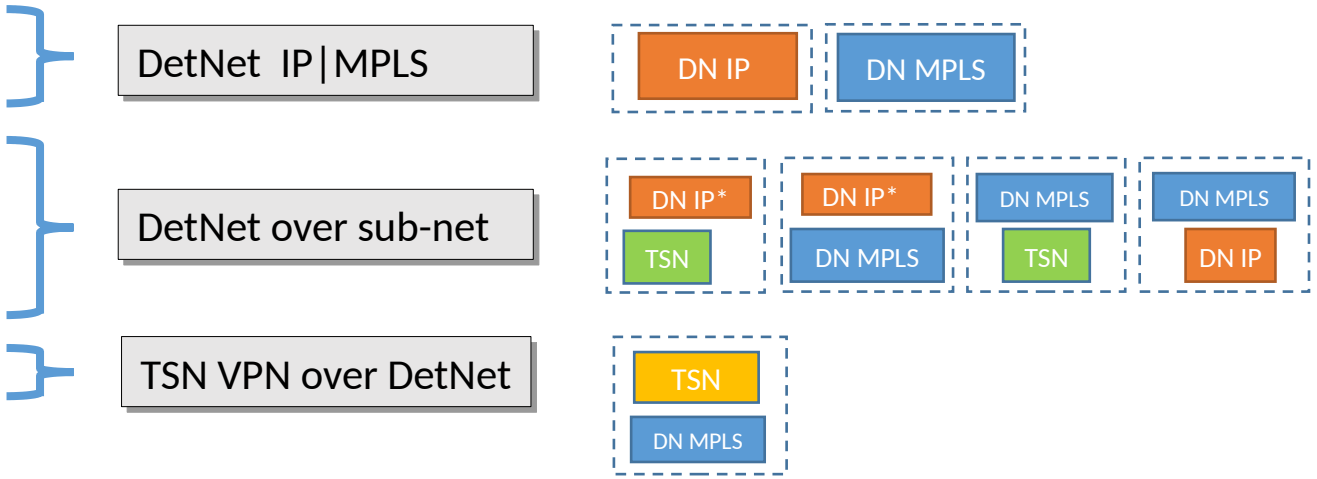
==> Need WG input to decide how to proceed

How many documents?
Proposal

- Current DetNet data plane specifications are composed of
  - Core data plane: DetNet IP and DetNet MPLS
  - Mapping of core data plane to underlying transport
    - IP ␣ DetNet MPLS and IEEE 802.1 TSN
    - MPLS ␣ DetNet IP and IEEE 802.1 TSN
  - MPLS document also has text covering TSN interconnect over MPLS
- Proposal – Follow MPLS RFC approach

  Specify building blocks:
  1. DetNet IP Data Plane (and Framework)
  2. DetNet MPLS Data Plane (and Framework)
  3. IP* over DetNet MPLS Data Plane
  4. IP* over IEEE 802.1 TSN
  5. DetNet MPLS over DetNet UDP/IP Data Plane
  6. DetNet MPLS over IEEE 802.1 TSN
  7. IEEE 802.1 TSN over DetNet MPLS





- Framework could also be published as separate (informational) document
  - Decide during the split?
- Current document structure facilitates this split
  - Some documents should be ready for LC immediately post-split

* - Covers DetNet and non-DetNet IP

How many documents?
Proposal

- Result of document split:

	Split draft publish	WG last call
1, DetNet IP Data Plane (and Framework)	o	o
2, DetNet MPLS Data Plane (and Framework)	o	o
3, IP over DetNet MPLS Data Plane	o	o
4, IP over IEEE 802.1 TSN	o	?
5, DetNet MPLS over DetNet UDP/IP Data Plane	o	o
6, DetNet MPLS over IEEE 802.1 TSN	o	?
7, IEEE 802.1 TSN over DetNet MPLS	o	

IPv{4|6} DetNet

IP data plane – Updates
draft-ietf-detnet-dp-sol-ip-02

- Terminology clean up
  - Adapt to latest architecture version (IESG review comments related changes)

- New content
  - Chapter 5: Management and Control Considerations
    - 5.1. Flow Identification and Aggregation
      - 6-tuple + some variants (IPSec, IPv6 flow label)
    - 5.2. Explicit Routes
      - Requirement: ability to assign a particular identified DetNet IP flow to a path through the DetNet domain that has been assigned the required nodal resources to provide the appropriate traffic treatment for the flow, and also to include particular links as a part of the path that are able to support the DetNet flow.
    - 5.3. Contention Loss and Jitter Reduction
      - Requirement: ability to manage node and link resources (control the required queuing mechanism along a flow's path)
    - …

Definition of controller plane for DetNet is out of the scope of this document

IP data plane – Updates
draft-ietf-detnet-dp-sol-ip-02

- New content
  - Chapter 5: Management and Control Considerations
    - …
    - 5.4. Bidirectional Traffic
      - MPLS definitions [RFC5654] are useful to illustrate terms such as associated bidirectional flows and co-routed bidirectional flows. There are no special bidirectional features with respect to the data plane other than the need for the two directions of a co-routed bidirectional flow to take the same path.
      - Bidirectional DetNet flows are solely represented at the management and control plane levels.
    - 5.5. DetNet Controller (Control and Management) Plane Requirements
      - Instantiate DetNet flows in a DetNet domain
      - Support DetNet flow aggregation
      - Advertise static and dynamic node and link resources such as capabilities and adjacencies to other network nodes (for dynamic signaling approaches) or to network controllers (for centralized approaches)
      - Scale to handle the number of DetNet flows
      - Provision flow identification information at each of the nodes along the path.

Definition of controller plane for DetNet is out of the scope of this document

IP data plane – Updates
draft-ietf-detnet-dp-sol-ip-02

- New content
  - NEW Chapter 7: IP over DetNet MPLS
    - Some text copied from MPLS data plane document
    - 7.1. IP Over DetNet MPLS Data Plane Scenarios
      - Scenarios: IP DetNet End System or IP End System over DetNet MPLS network
    - 7.2. DetNet IP over DetNet MPLS Encapsulation
      - The basic encapsulation approach is to treat a DetNet IP flow as an app-flow from the DetNet MPLS app perspective.
    - 7.3. DetNet IP over DetNet MPLS Flow Identification Procedures
      - Relay node procedures defined
    - 7.4. DetNet IP over DetNet MPLS Traffic Treatment Procedures
      - Relay node procedures defined

IP data plane – Updates
draft-ietf-detnet-dp-sol-ip-02

- New content
  - Chapter 8: Mapping DetNet IP Flows to IEEE 802.1 TSN
    - 8.3. Procedures
      - DetNet IP data plane procedures to interwork with a TSN underlay sub-network when the IP (DetNet) node acts as a TSN-aware Talker or Listener
      - These procedures have been divided into the following areas: (i) flow identification, (ii) mapping of a DetNet flow to a TSN Stream and (iii) ensure proper TSN encapsulation.
    - 8.4. Management and Control Implications
      - DetNet flow and TSN Stream mapping related information are required only for TSN-aware IP (DetNet) nodes.

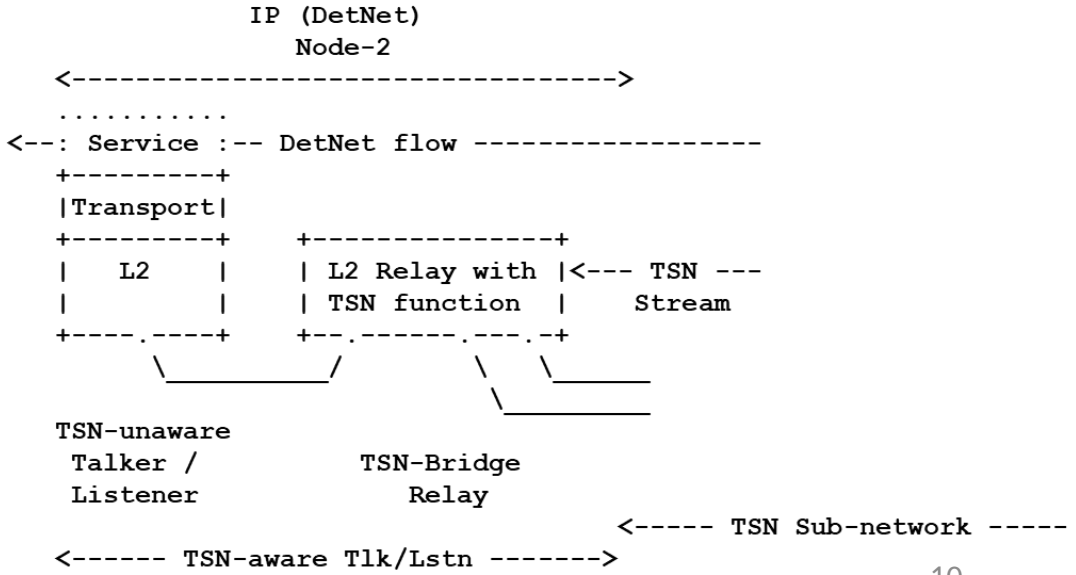


Figure 10: IP (DetNet) node with TSN functions

IP data plane – Further work
Need discussions

- Further work needed
  - OAM (chapter 4.4) ␣ Cover in the separate OAM document?
  - TSN as sub-network (chapter 8.1) – Additional clarifications

  - Document structure (see key open issue …)
  - General editorial clean up

MPLS DetNet

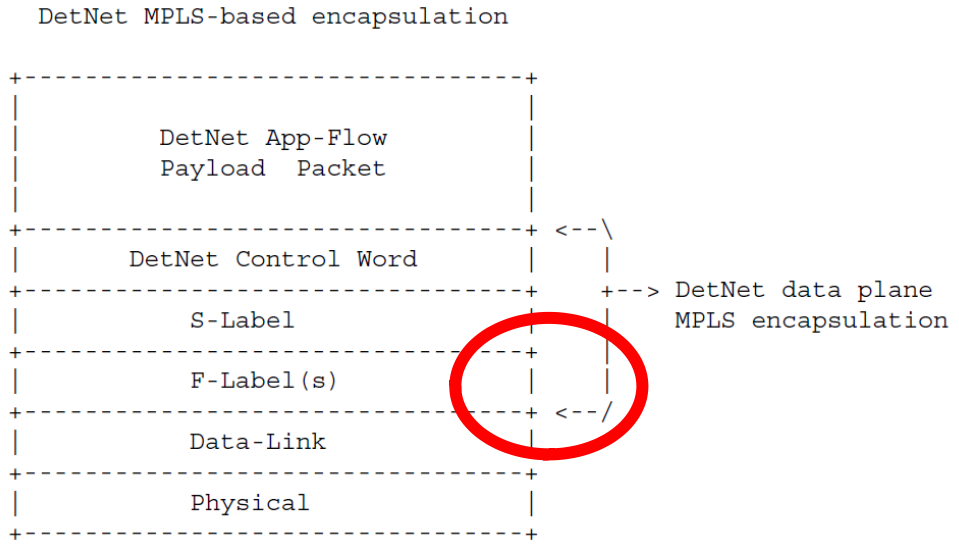
MPLS data plane – Updates
draft-ietf-detnet-dp-sol-mpls-02

- Terminology clean up
  - Adapt to latest architecture version (IESG review comments related changes)
- Editorial changes
  - Native speakers review, THANKS

- Changes
  - Chapter 1. Introduction
    - Editorial update
  - Chapter 4. DetNet MPLS Data Plane Overview AND
    Chapter 5. DetNet MPLS Data Plane Considerations
    - Proposal to move text to other documents: Specifics related to non-MPLS DetNet end station behavior are out side the scope of this document. (see key open issue …)

MPLS data plane – Updates
draft-ietf-detnet-dp-sol-mpls-02

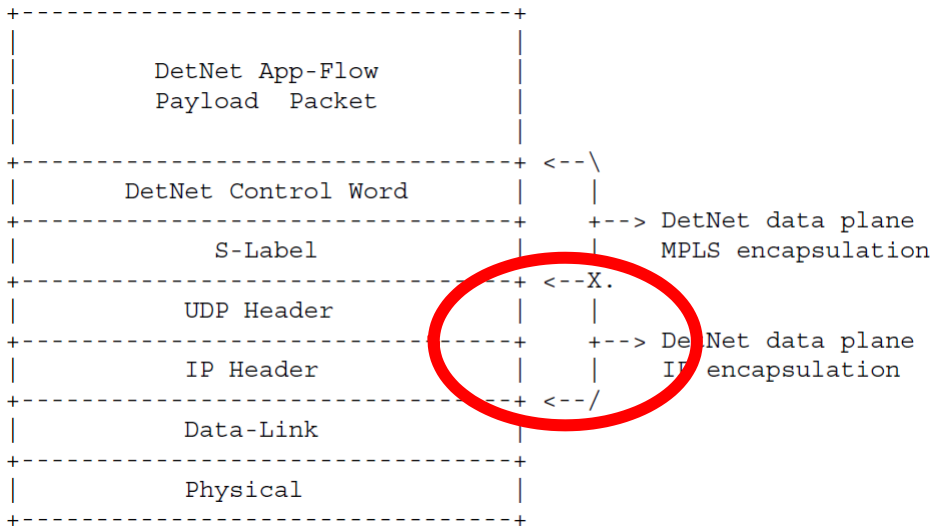
- Changes
  - Chapter 6. MPLS-Based DetNet Data Plane Solution
    - 6.2. MPLS Data Plane Encapsulation
      - Includes both S-label and F-label(s)
    - 6.2.2. S-Labels
      - S-Labels MUST be allocated by the entity that controls the service sub-layer receiving node's label space, and MAY be allocated from the platform label space [RFC3031].
      - Note that choice to use platform label space for S-Label or S-Label plus one or more F-Labels to identify app flows is a local implementation choice
      - While NOT REQUIRED, the use of platform labels for S-Labels matches other pseudowire encapsulations.



    - New chapters on
      - PEF/POF processing (6.2.2.1. / 6.2.2.2.)
      - F-label(s) (6.2.3.)

MPLS data plane – Updates
draft-ietf-detnet-dp-sol-mpls-02

- New content
  - Chapter 7. Controller Plane (Management and Control) Considerations
    - Instantiate DetNet flows in a DetNet domain
    - Manage DetNet S-Label and F-Label allocation and distribution
    - Support DetNet flow aggregation
    - Advertise static and dynamic node and link resources such as capabilities and adjacencies to other network nodes (for dynamic signaling approaches) or to network controllers (for centralized approaches)
    - Scale to handle the number of DetNet flows
    - Provision flow identification information at each of the nodes along the path.
  - Chapter 9. DetNet MPLS Operation over DetNet IP PSNs
    - an implementation MUST support the provisioning of IP/UDP header information in place of sets of F-Labels.



MPLS data plane – Further work
Work in progress …

- Further work needed
  - Document structure (see key open issue …)
  - General editorial clean up

Next steps

Summary – Next Steps

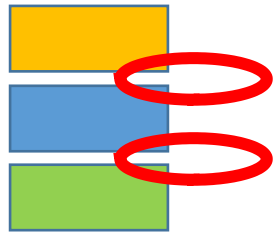
- Revise/split documents as discussed today
- Finalize core content
- Aim to start WG last call(s) before Montreal

	Split draft publish	WG last call
1, DetNet IP Data Plane (and Framework)	o	o
2, DetNet MPLS Data Plane (and Framework)	o	o
3, IP over DetNet MPLS Data Plane	o	o
4, IP over IEEE 802.1 TSN	o	?
5, DetNet MPLS over DetNet UDP/IP Data Plane	o	o
6, DetNet MPLS over IEEE 802.1 TSN	o	?
7, IEEE 802.1 TSN over DetNet MPLS	o	

Thanks …

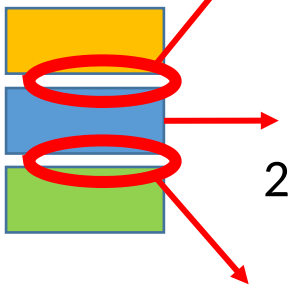
Data plane
General discussions on documents' structure

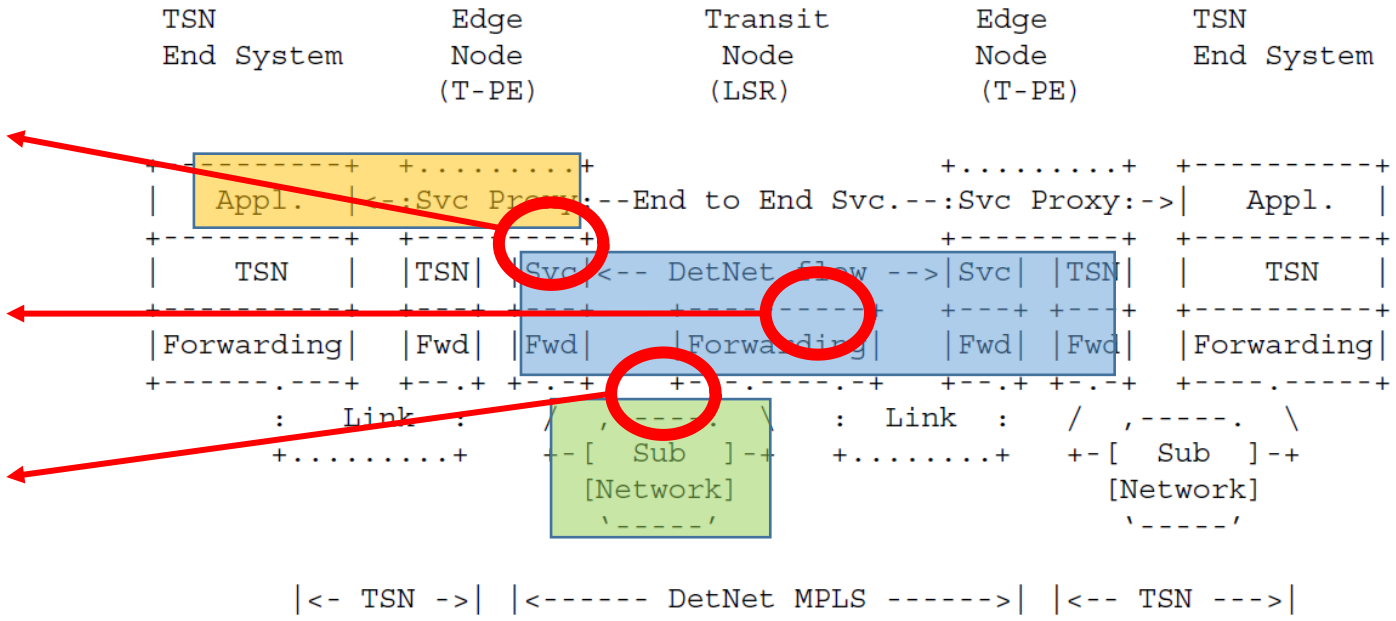
- List of architectural building blocks:
  - App-flow: (i) IP app-flow and (ii) Ethernet app-flow.
  - DetNet PSN: (m) DetNet IP and (n) DetNet MPLS.
  - Sub-networks: (x) TSN, (y) IP and (z) MPLS.



- "App-flow over DetNet"
- "DetNet over sub-net"

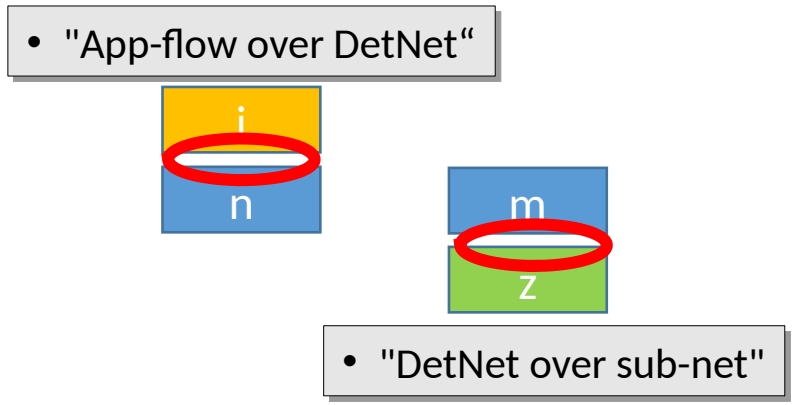
- Topics to cover:
  1. Identification and mapping App-flow at the edge of the DetNet domain (@UNI) --> edge nodes
  2. Serve the DetNet flow inside the DetNet domain --> relay nodes, transit nodes
  3. Interconnect DetNet nodes --> using sub-networks

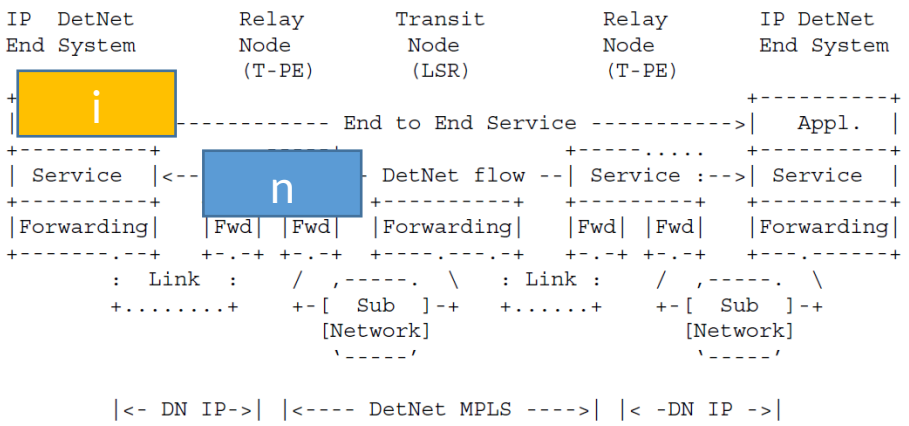


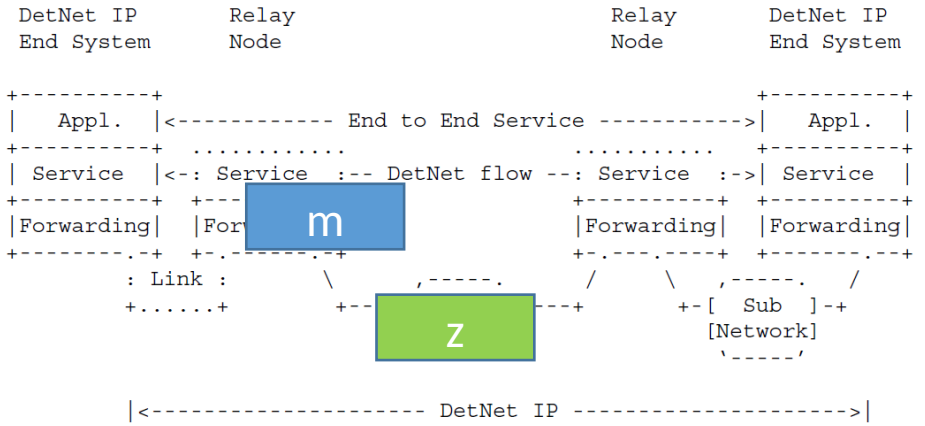


Data plane
General discussions on structure of documents

- Some scenarios are identical …
  - Example
    - “(i) over (n)”:DetNet IP flow over DetNet MPLS
    - “(m) over (z)”: IP DetNet over MPLS sub-net



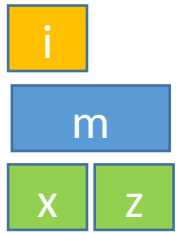




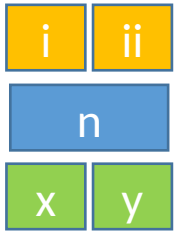
Data plane
Current status

What is covered in current versions (v02)?

- IP Data Plane
  - App-flow: (i) IP app-flow and (ii) Ethernet app-flow (ii) out-of-scope
  - DetNet PSN: (m) DetNet IP and (n) DetNet MPLS (n) N/A
  - Sub-networks: (x) TSN, (y) IP and (z) MPLS (y) N/A



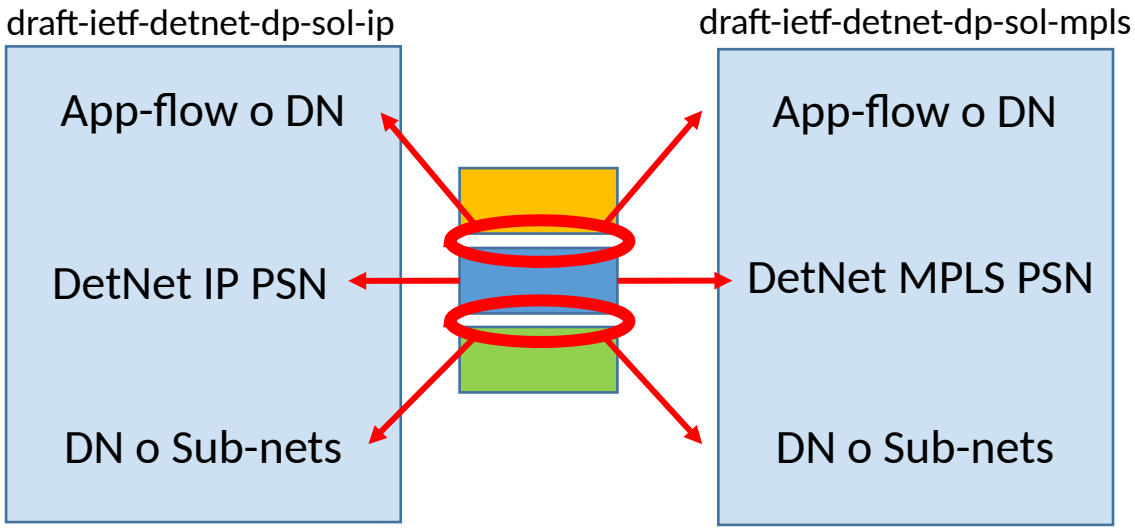
- MPLS Data Plane
  - App-flow: (i) IP app-flow and (ii) Ethernet app-flow -
  - DetNet PSN: (m) DetNet IP and (n) DetNet MPLS (m) N/A
  - Sub-networks: (x) TSN, (y) IP and (z) MPLS (z) N/A



Data plane
General discussions on documents' structure

Questions:

- Are we OK with current structure?



- How many documents?
  - Two, Three, Six or other …
- How to handle overlap?
  - MPLS PSN as base document to refer to
- Any missing scenarios?
  - TSN over DetNet IP is out-of-scope …
- Create dedicated TSN over DetNet document?