In-situ Flow Information (iFIT)

draft-song-opsawg-ifit-framework-07

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Motivation

- Clarify the terms and underlying techniques for data plane on-path telemetry
- Spell out key deployment challenges, especially in carrier networks
- Propose a high level architectural framework with a few key components aiming to solve the challenges
- Present the potential to apply such a framework to realize closed-loop telemetry application
- Identify gaps and directions for related standard development
- Out of scope: component/interface specification and implementation

On-path Data Plane Telemetry

Passive   Hybrid   Active

Passport   Postcard

Passport	Postcard
IOAM Trace	IOAM DEX
IOAM E2E	PBT-M
IFA	
HTS	
EAM	

Challenges for Deployment in Carrier Networks

- Performance

  - Forwarding impact due to packet processing

  - Bandwidth and server overload due to exported data

- Limited data flexibility and extensibility

- Deployment issues

  - Encapsulation

  - Tunnel

- Primitives, models, API for telemetry applications (not covered in this draft)

Key Components Addressing the Challenges

Performance

Deployability

Flexibility

Smart Flow/Data Selection

Export Data Reduction

Encapsulation & Tunnel Modes

Dynamic Network Probe

On-demand Technique Integration

iFIT Architectural Framework

```
               +--------------------------------------------+
               |                iFIT Applications           |
               |  +--------------+        +-----+-----+      |
               |  |              |        |     |     |      |
               |  | Controller   |<-------| Collector |      |
               |  |              |        |           |      |
               |  +-----:------+           +----------+      |
               |        :                        ^           |
               +-------:------------------------|-------+
                       :configuration           |telemetry data
                       :                         |
         ..............:.....................|..............
         :             :                :     |         :
         :    +---------:--+------------:---++--------:---+
         :    |            :            |   ||        :   |
         V    |            V            |   V|        V   |
    +------+-+    +-----+--+     +------+-+     +------+-+
 usr pkts  | iFIT    |    | Path    |    | Path    |    | iFIT    |
   ====>|  Head   |====>| Node    |==//==>| Node    |====>| End     |====>
        |  Node   |    | A       |    | B       |    | Node    |
        +--------+    +--------+     +--------+     +--------+

        |<---                 iFIT Domain                --->|
```
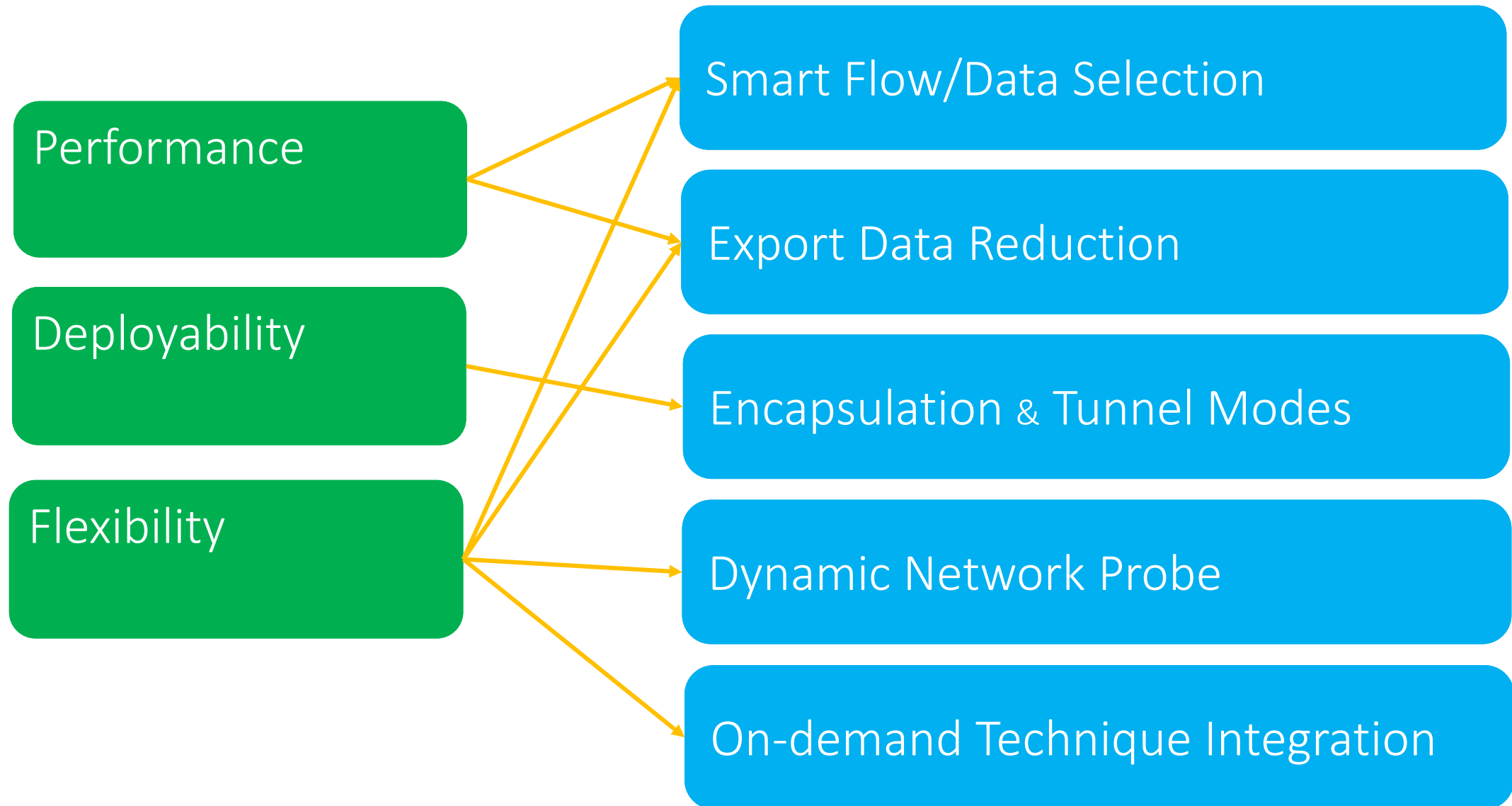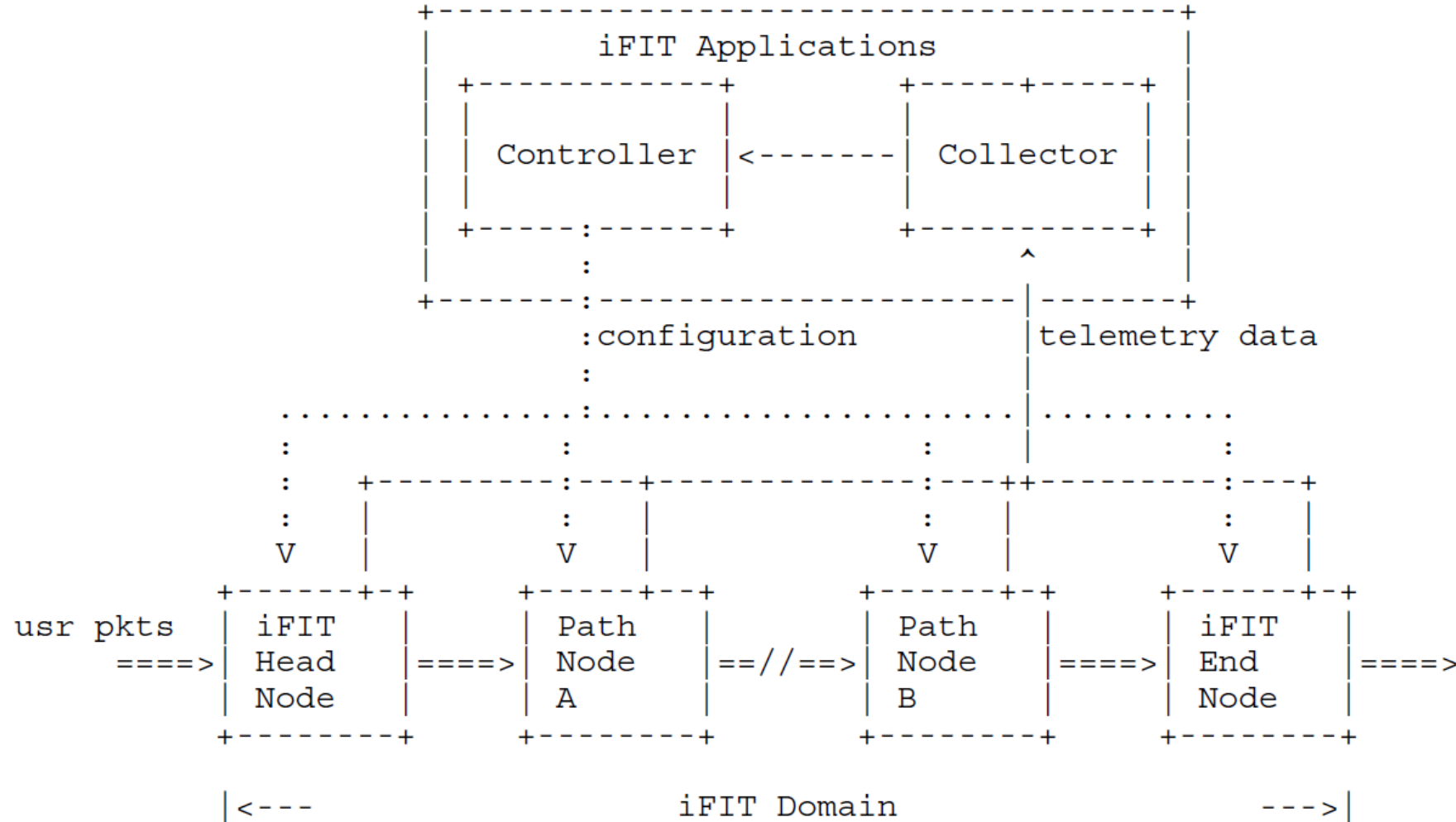
Closed-Loop Architecture for Telemetry Applications

```
                        +-------------------------+
                        |                         |
            +-------+   iFIT Applications    |<-------+
            |       |                         |        |
            |       +-------------------------+        |
            |             Technique Selection          |
            |             and Integration              |
            |                                          |
            |Smart Flow                        Smart   |
            |and Data          closed-loop     Data    |
            |Selection                         Export  |
            |                                          |
            |                                 +----+----+
            V                             +---------+|
     +-----------+  Encapsulation         +---------+||
     |  iFIT     |  and Tunneling         |  iFIT   |||
     |  Head     |----------------------->|         |||+
     |  Node     |                        |         ||+
     +-----------+                        |  Nodes  |+
        DNP                               +---------+
                                             DNP
```
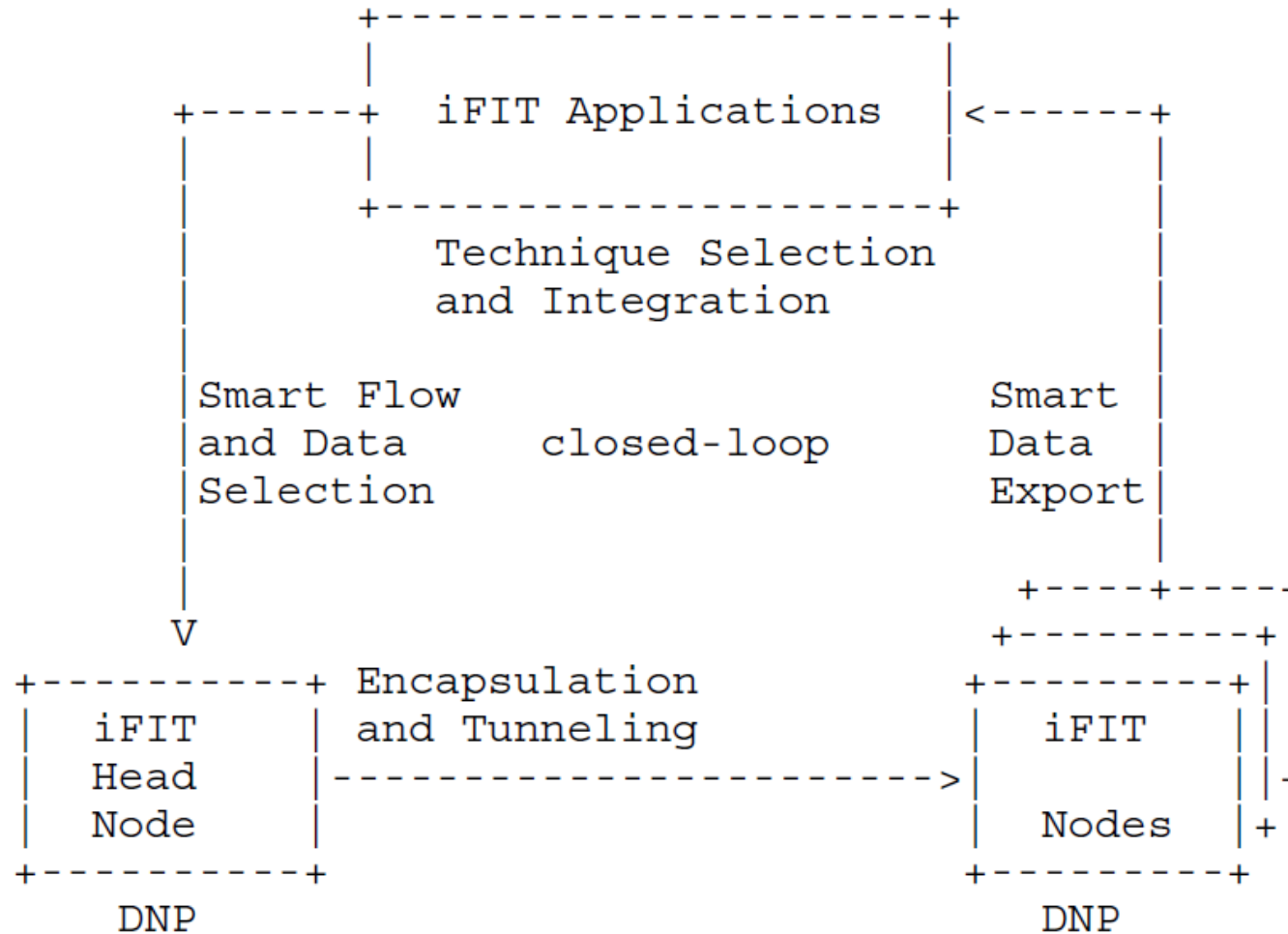
Examples

- Smart Flow and Data Selection

  - Sketch-guided Elephant Flow Selection

  - Adaptive Packet Sampling

- Smart Data Export

  - On-demand Anomaly Monitor

Discussion & Next Steps

- Main contribution

  - Challenges and requirements

  - High level framework

- Collect feedbacks

- Request for WG adoption

- Future work

  - Analysis on standard gaps for interfaces

  - ???