One-way Delay Measurement Based on Deterministic Networking

draft-li-ippm-deterministic-owd-measurement-00

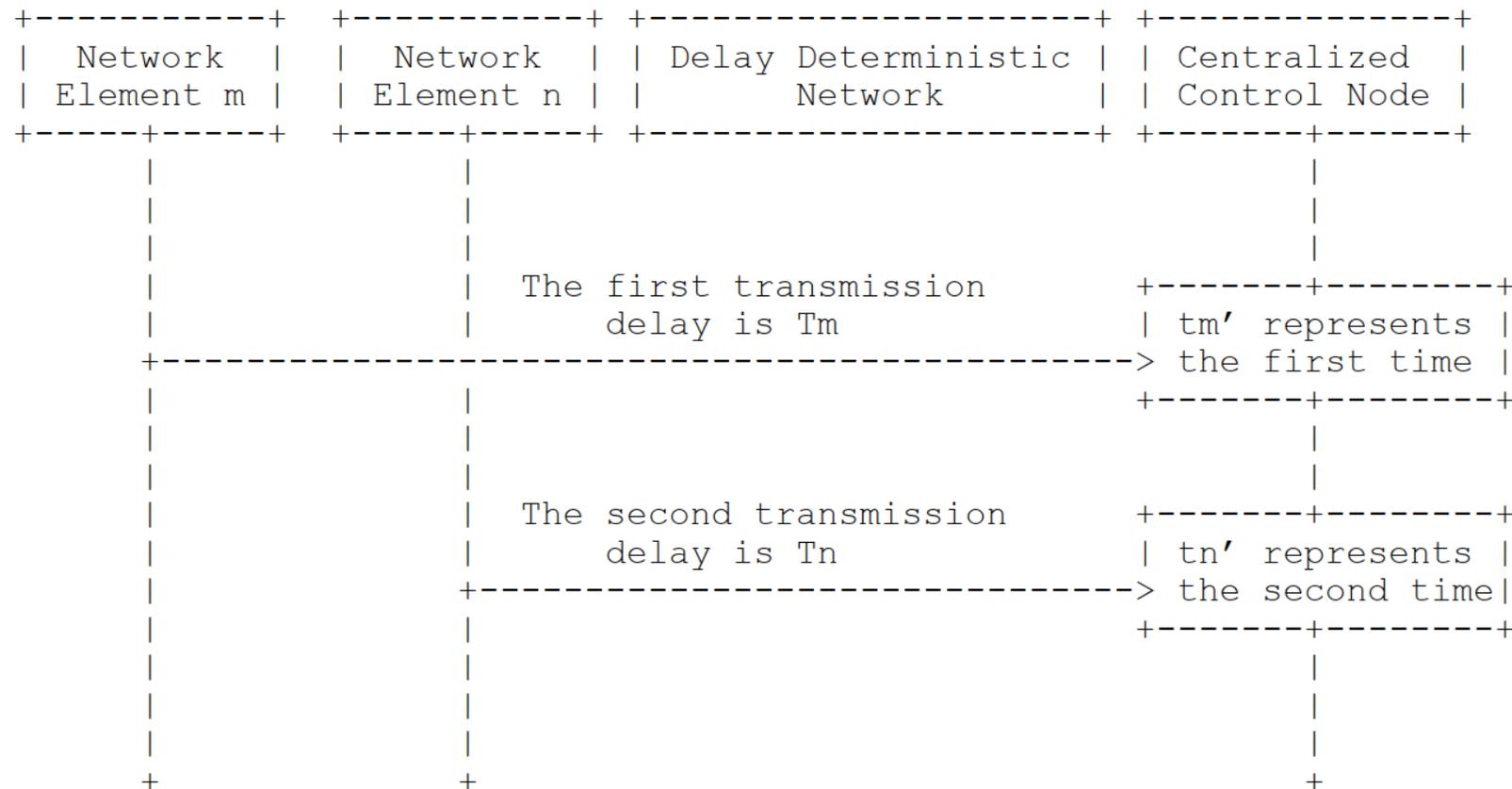Presenter: Yang Li (China mobile)

Background

- Shortcomings of existing one-way delay measurement methods
  - If measurement message is injected into actual network, it will occupy network bandwidth resources and interfere with the actual service flow, so the measured delay is not the delay of the actual service.
  - Measurement equipment or network elements need to support time synchronization protocols, which is difficult to implement and costly.

Introduction

- **A new method**
  - A centralized management unit for collecting network information
  - The management network from each network element to the centralized management unit leverages delay deterministic network

```
+--------------------------------------------------------------+
|                    Centralized Control Node                  |
+----+--------------+---------------+---------+---------+----+
     ^              ^               ^         ^         ^
     |              |          T4 |     T3 |         | Tn
     |              |              |   +----+----+      |
     |              |              |   | Network |      |
 T1 |          T2 |   +----------------------------->Element 3+-+   |
     |              |   |          |   |          | |   |
     |              |   |          |   +--------+  |   |
     |              |   |          |              |   |
     |              |   |          |              |   |
     |              |   |          |              |   |
     |              |   |          |              |   |
+----+----+    +----+--+-+    +----+----+      +-v--+----+
| Network |    | Network |    | Network |      | Network |
|Element 1+--->Element 2+----->Element 4+--------->Element n|
|         |    |         |    |         |      |         |
+---------+    +---------+    +---------+      +---------+
```

Detailed Measurement Procedures

- **Delay Calculation:**   Delay=tn'-tm'+Tm-Tn

```
+-----------+  +-----------+ +---------------------+ +--------------+
|  Network  |  |  Network  | | Delay Deterministic | | Centralized  |
| Element m |  | Element n | |       Network       | | Control Node |
+-----+-----+  +-----+-----+ +---------------------+ +-------+------+
      |              |                                       |
      |              |                                       |
      |              |                                       |
      |              |       The first transmission    +------+-------+
      |              |            delay is Tm          | tm' represents |
      +--------------------------------------------------> the first time |
      |              |                                 +------+-------+
      |              |                                       |
      |              |                                       |
      |              |       The second transmission   +------+-------+
      |              |            delay is Tn          | tn' represents |
      |              +--------------------------------------> the second time|
      |              |                                 +------+-------+
      |              |                                       |
      |              |                                       |
      |              |                                       |
      +              +                                       +
```

Advantages

- A novel one-way delay measurement approach:
  - without sending measurement messages
  - without changing the actual network status
  - without changing service messages
  - without the need for time synchronization

Next steps

- Detailed implementation of this idea in operational network.
- You are welcome to join our work.

Thanks!