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ACTN Use-cases for Packet Transport Networks in Mobile Backhaul Networks
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Abstract

   This document describes the key requirements for ACTN in carrier's
   transport networks, which mainly focus on the Packet Transport
   Networks.

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1. Introduction

MPLS-TP based packet transport network (PTN) has been widely used as
mobile backhaul and enterprise customer private line/LAN solutions
in many carrier's networks. The Packet Transport Networks work in
different layers from L2 to L3 and in different areas such as access,
metro and backbone networks. In the application scenarios, the most
important requirements for operators are to solve the
interoperability problems between multi-domain/multi-layer networks,
realize the fast service provisioning, and improve the network
operation efficiency.

The PTN operators may use ACTN to improve efficiency of provision
and operation, optimize the resources utilization, and promote the
customer's experiences. This draft mainly discusses the key
requirements for ACTN in carrier's Packet Transport Networks.

2. ACTN Requirement for Packet Transport Networks

2.1. End-to-End Enterprise Services Provisioning

The enterprise customer services are sensitive to the network
quality, have strict time-limit requirement for service
establishment. Faster end-to-end service provisioning may make the
operators win the competition.

The operators had built a large scale of packet transport networks
and divided them into different areas such as access, metro and
backbone networks, each area has their own management systems.
Currently in most application scenarios, PTN networks are using
static provisioning with centralized Network management Systems
(NMS). However, they are hard to meet the requirements of current
enterprise services for fast provisioning and efficient operation.

The ACTN architecture [ACTN-FWK] should be considered to coordinate
with traditional the networks management systems, so as to realize
the end-to-end service provision.

```
    |                   End-to-End Connection                    |
    |<---------------------------------------------------------->|
    |                                                            |
       +--------+  +-------+  +-------+  +-------+  +-------+
       | Access |  | Metro |  | Core  |  | Metro |  | Access|
```

```
   +--+  | PTN     |  | PTN    |  | PTN    |  | PTN    |  | PTN    |  +--+
   |CE|==|(Vender  |==|(Vender|==|(Vender|==|(Vender|==|(Vender|==|CE|
   +--+  |    A)   |  |   B)  |  |   C)  |  |   D)  |  |   E) |  +--+
         +--------+  +-------+  +-------+  +-------+  +-------+
```
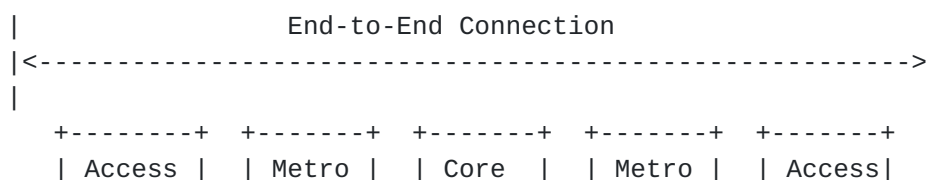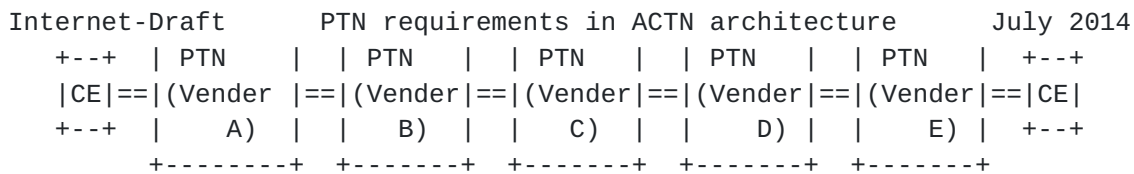
              Figure 1 End-to-End Connection in Mobile Backhaul Networks

[2.2]. Multi-layer coordination Requirement in L2/L3 Packet Transport Networks

   LTE backhauling requires the PTN to realize L3 network function.
   This function requires the management systems operate in different
   layers of networks, and leads to separate and fragmented network
   configuration. Further, the L2 PTN and L3 PTN networks may be
   provided by different venders, and make the end-to-end provisioning
   much more complex. In the ACTN architecture, new functions such as
   topology detection and virtualization, auto-routing calculation are
   introduced. With these functions, operator can improve the user
   experiences and lower the OPEX.

   On the other hand, operators want to obtain the flow information and
   realize the load balancing within L3 PTN networks,

```
                     |        End-to-End Connection     |
                     |<-------------------------------->|
                     |                                  |
                         +----------+   +----------+
       +--------+        |          |   |          |        +--------+
       | Radio  |        | Layer 2  |   | Layer 3  |        | Radio  |
       | Access |===|    PTN   |===|    PTN   |===| Core   |
       |Networks|        | Networks |   | Networks |        |Networks|
       +--------+        |(Vender A)|   |(Vender B)|        +--------+
                         |          |   |          |
                         +----------+   +----------+
```
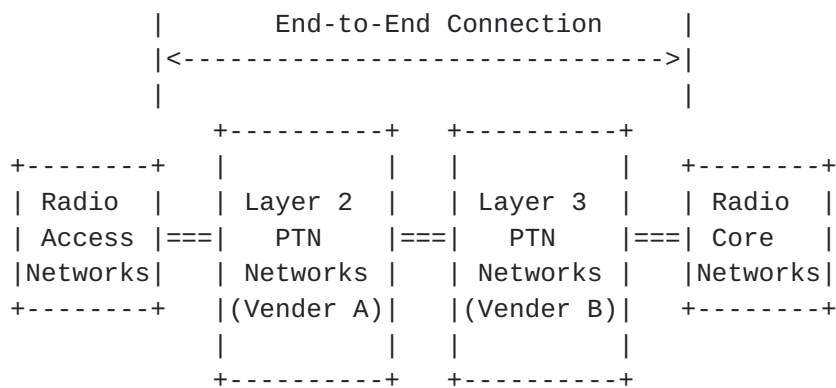
              Figure 2 End-to-End Connection for L2&L3 PTN Networks

[2.3].   Optimizing the network resources utilization

   The packet transport networks can support various performances
   monitoring matrix, such as traffic flow statistics, packet delay,
   delay variation, throughput and packet-loss rate, etc. All these
   performance parameters can support the enterprise customers SLA
   requirements. Through the performance monitoring, the PTN can

   realize the service SLA optimization and network traffic
   optimization. See [ACTN-PERF] for related discussion.

3. Virtual Networks Operations for Packet Transport Networks

   Figure 3 shows an example of virtual network operations for packet
   transport networks. In order to realize end-to-end service provision,
   the ACTN architecture [ACTN-FWK] should consider coordination with
   traditional network management systems. By the network
   virtualization and abstraction, the traditional networks can be
   considered as a virtual network for VNC service provider, which can
   be realized by network management systems providing an abstract
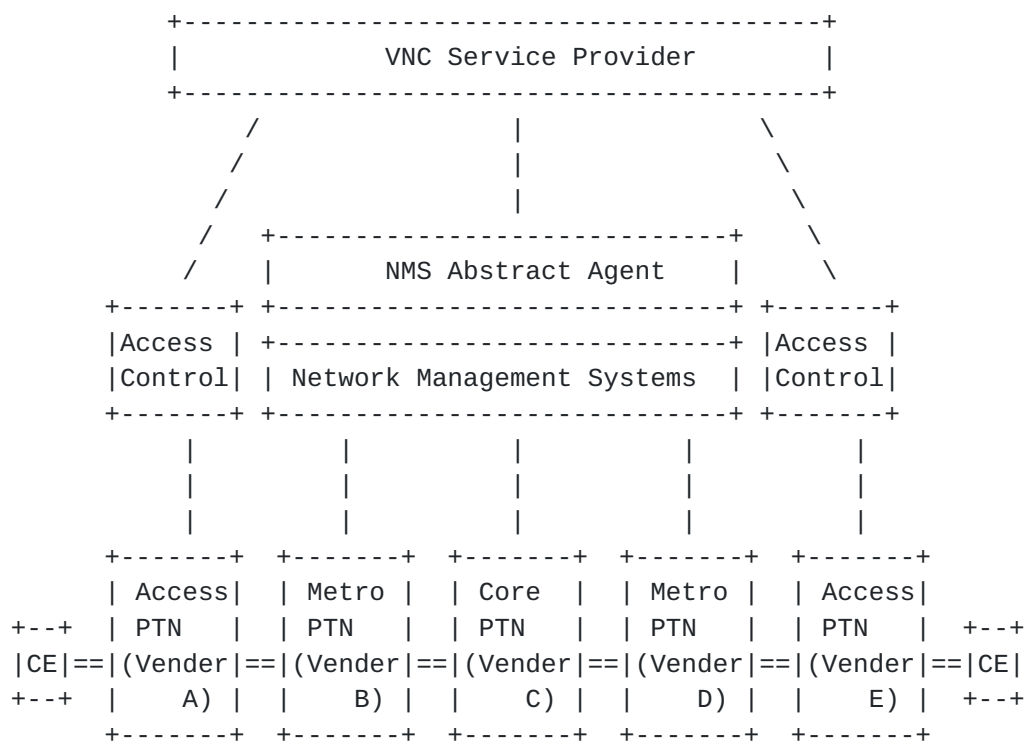   agent for VNC, or the VNC providing traditional interface for NMS.

```
          +------------------------------------------+
          |             VNC Service Provider         |
          +------------------------------------------+
              /                   |              \
             /                    |               \
            /                     |                \
           /    +----------------------------+    \
          /     |      NMS Abstract Agent    |     \
      +-------+ +----------------------------+ +-------+
      |Access | +----------------------------+ |Access |
      |Control| | Network Management Systems | |Control|
      +-------+ +----------------------------+ +-------+
          |         |         |         |          |
          |         |         |         |          |
          |         |         |         |          |
      +-------+ +-------+ +-------+ +-------+ +-------+
      | Access| | Metro | | Core  | | Metro | | Access|
  +--+ | PTN   | | PTN   | | PTN   | | PTN   | | PTN   | +--+
  |CE|==|(Vender|==|(Vender|==|(Vender|==|(Vender|==|(Vender|==|CE|
  +--+ |   A) | |   B) | |   C) | |   D) | |   E) | +--+
      +-------+ +-------+ +-------+ +-------+ +-------+
```

          Figure 3 End-to-End Connection in Mobile Backhaul Networks

4. Security Considerations

   This document raises no new security issues.

5. IANA Considerations

No new IANA considerations are raised by this document.

6. References

6.1.   Informative References

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[ACTN-PERF] Yunbin Xu, Weiqiang Cheng, Guoying Zhang and Haomian
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