

Defining Network Capacity

draft-cui-ippm-rfc5136bis-00

Xiangsong Cui, Xiangsong.Cui@huawei.com

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What is the problem in RFC5136?

- RFC5136 defines link and path differently from earlier well-known RFCs (i.e., RFC2460 and RFC2330).
- RFC5136 defines link capacity and path capacity based on these newly defined "link" and "path" definitions. So it is ambiguous just what is getting measured, and what the metrics relate to.

Why is that a problem?

- The definitions and metrics defined in RFC5136 are not compatible with Framework for IP Performance Metrics [RFC2330], which is a normative reference in RFC5136.
- The implied reference model in RFC5136 is that the router (or part of the router) is a part of the link. The reference model in RFC5136 is very different from that defined in other RFCs and ITU-T documents.
- The definitions and metrics in RFC5136 may be confusing for people with the normal understanding on link and path concept.

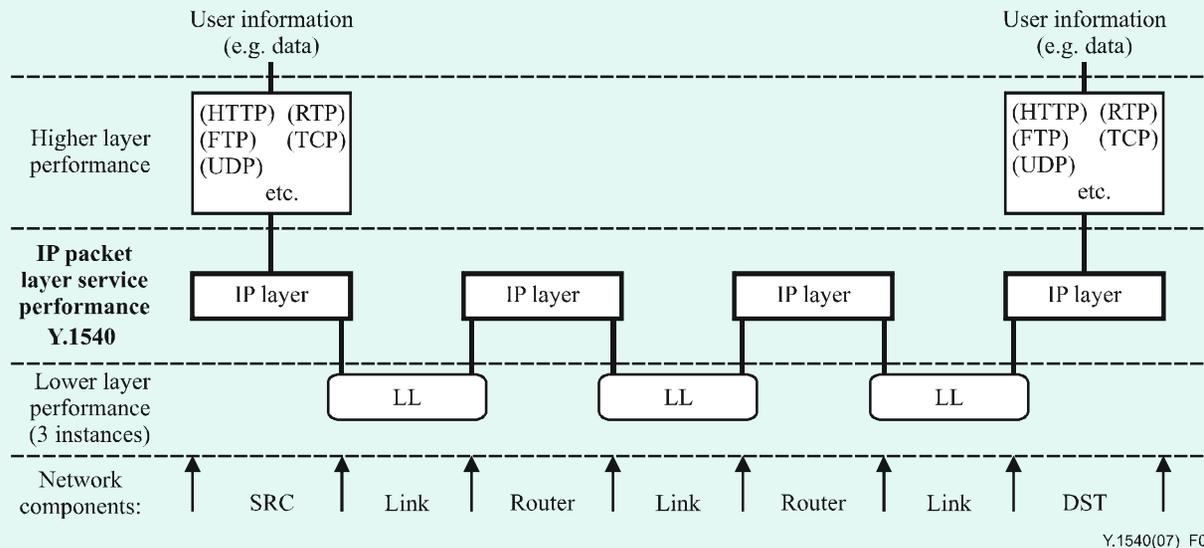
The well-known reference model

- *For example, when considering a router in the context of packet forwarding, we might model the router as a component that receives packets on an **input link**, queues them on a **FIFO packet queue** of finite size, employs tail-drop when the packet queue is full, and **forwards** them on an **output link**. The **transmission speed (in bits/second) of the input and output links**, the **latency in the router (in seconds)**, and the **maximum size of the packet queue (in bits)** are **relevant analytical metrics**.*
- *{Comment: for example, when considering the flow capacity of a path, it may be of real value to be able to model each of the routers along the path as packet forwarders as above.
[[snipped]] }*

-- Section 7 of RFC2330

The well-known reference model (cont.)

- *Link: A point-to-point (physical or virtual) connection used for transporting IP packets between a pair of hosts. **It does not include any parts of the hosts or any other hosts**; it operates below the IP layer .*
- *Figure 2 – Layered model of performance for IP service – Example*

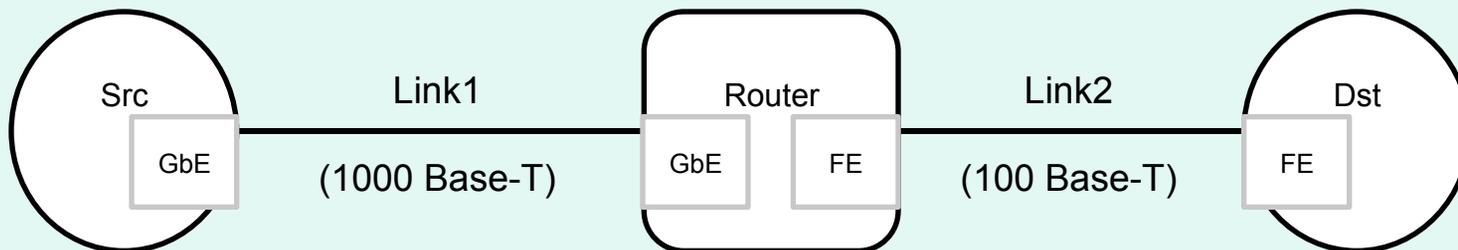


--Section 5&4 of ITU-T Y.1540

Example of the problem in RFC5136

Assumption:

- All nodes are installed with CPU which provides the capacity of 1M bits proceeding (e.g. transmitting, forwarding and receiving) per second.
- 99% bits of the bit flow are IP-layer bits, no bit lost or error



- Link1 capacity (IP layer), 0.99 M or 990 M? (I think it is 990 M bps.)
- Link1 utilization (IP layer), 0.1% or 100%? (I think it is 0.1%, i.e., $0.99 / 990$.)
- Link2 capacity (IP layer), 0.99 M or 99 M? (I think it is 99 M bps.)
- Link2 utilization (IP layer), 1% or 100%? (I think it is 1%, i.e., $0.99 / 99$.)
- Path (Src to Dst) capacity (IP layer)? (I think it is 0.99 M, i.e., the node capacity)
- Available path capacity (IP layer)? (I think it is 0)

IPPM charter review

- *The intent of the WG is to cooperate with other appropriate standards bodies and forums (such as ATIS IIF, ITU-T SG 12, 13 and 15, MEF) to **promote consistent approaches and metrics**. Within the IETF process, IPPM metrics definitions will be subject to **as rigorous a scrutiny for usefulness, clarity, and accuracy as other protocol standards**.*
- Section Capacity may be a complementary to Link Capacity, but it can not provide rigorous scrutiny as Link Capacity and Router Capacity does. Hence, Link Capacity can not be simply replaced by Section Capacity.

Parallel work in ITU-T SG12

- It seems SG12 has already adopted the idea of RFC5136bis draft.
- *RFC 5136 defines capacity-related parameters similar to what is defined in Y.1540 section 6.11. However, one major difference between the ITU-T and IETF definitions is that Y.1540 takes into account that network hosts may affect IP-layer capacity parameter values. This is not covered by RFC 5136, but it has been up for discussion in IETF, mainly triggered by the draft-cui-ippm-rfc5136bis-00 document. The Y.1540 parameters are defined over basic sections which inherently take into account the capacity of both links and hosts in that section.*

-- Appendix VIII.2 of Y.1540 (01/2011)

Proposed solution in IPPM

- Since the problem in RFC5136 concerns the basic definitions, and since the metrics in RFC5136 are based on these definitions, it is difficult to clarify the problem by an Errata Report and a thorough modification is needed.
- The network capacity document is proposed to be re-written to eliminate the gap between the ITU-T and IETF.
- The RFC5136bis draft is proposed to be adopted by IPPM WG and comments on this draft (e.g., those which arose in IETF 79 meeting) may be addressed during WG-ID phase.

Where to go now?

