

Broadband metrics & Internet service

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Defining broadband

‘Always on’ access to the Internet at data transmission rates above some threshold

- **May also provide access to IP-based services**
- **Transmission rate of broadband service is very unreliable guide to quality of higher-layer services, e.g. Internet service**

Broadband is not the clean water supply, it is the ‘pipe’ through which services ‘flow’

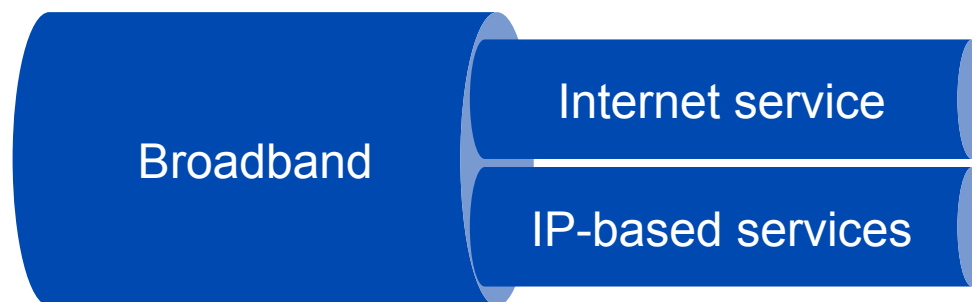
- **Pipe is necessary but not sufficient**
- **Value is in the services**
- **Testing for clean water**

Defining Internet service

Internet protocol (IP) technology enormously successful

Used for a wide range of networked services, in addition to Internet service

Clear definition of Internet service required to facilitate measurement



Definitions

The Internet is ...

... the system of interconnected networks that use IETF-specified best current practices and protocols, including the Internet Protocol, for communication with resources or endpoints reachable via a globally unique Internet address.

Definitions

Internet service is ...

... connection of an Internet endpoint or network to the rest of the Internet with non-discriminatory, best-effort routing of data packets as part of the Internet.

Necessary to establish this baseline, to allow for transparency through itemisation of exceptions to the baseline

Alternative route of itemising features isn't practical given dynamic and diverse nature of the medium

Can include application-agnostic congestion management, for example, or traffic management to maintain network resilience

Not alone

“Internet access should be clearly defined and the use of the term in marketing restricted to those who provide open access to the internet. This measure could be implemented nationally under consumer protection powers.”

- ***‘The open internet – a platform for growth’*, a report for the BBC, Blinkbox, Channel 4, Skype and Yahoo!, October 2011**

“In this scope, using a common frame of reference – for example, regarding what “Internet access” is supposed to encompass - may lead to a simpler range of information for customers, such as only listing the differences between the offer and the reference.”

- **DRAFT BEREC Guidelines on Net Neutrality and Transparency: Best practices and recommended approaches, October 2011**

Implications for metrics

IP-based services vs. Internet services

- **Measurements of Internet service performance must be made in the presence of bundled IP-based services where present**

Peering and transit links

- **Measurements must be to a wide range of destinations**

Ability to evolve

- **Connectivity and throughput tests must use a broad range of protocols, applications and destinations**
- **Testing support for the ‘long tail’**

A popular current testing regime

- ICMP latency and packet loss
 - ping a few well-known hosts, record latency and loss
- Recursive DNS resolver responsiveness and failures
 - dig hostnames of a few popular hosts, record resolution time in ms and failures
- Web page loading times
 - fetch main HTML body from a few popular websites, record time in ms to receive complete response and failures
- Voip capability
 - 10 second burst of 160-byte UDP packets at 64kbps to one of several target servers
 - only upstream due to NAT issues for downstream testing, record delay, loss, jitter
- SMTP email relaying
 - periodically send mail to test address using ISP SMTP relay, record latency and failures
- Speed tests
 - HTTP download on port 80, single thread
 - HTTP upload ”
 - HTTP download on port 80, multi-thread
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Metrics for Internet service

Basket of services?

- Not just popular applications, diversity is a feature

IPv6

- to ensure continued global end-to-end addressability

Looking further ahead:

- security

Conclusions

Broadband deployment is a means to an end

Internet service is the thing of most utility

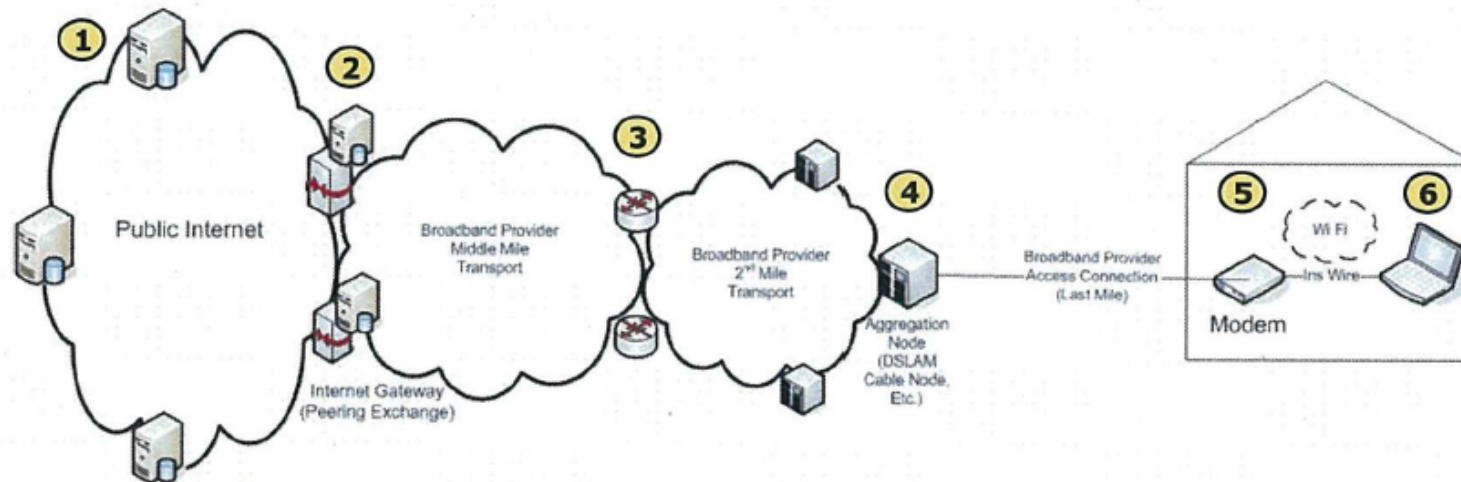
We must share a definition of Internet service

Build measurement methodologies designed to reveal the quality of that service, so defined

Testing diversity and global reach are key to ensuring the long-term viability of the Internet as a platform for innovation and growth

Backup slides

Measurement points reference diagram



DEFINITIONS

- 1** **Public internet content:** public internet content that is hosted by multiple service providers, content providers and other entities in a geographically diverse (worldwide) manner
- 2** **Internet gateway:** closest peering point between broadband provider and public internet for a given consumer connection
- 3** **Link between 2nd Mile and Middle mile:** broadband provider managed interconnection between middle and last mile
- 4** **Aggregation node:** First aggregation point for broadband provider (e.g. DSLAM, cable node, satellite, etc.)
- 5** **Modem:** CPE (customer premise equipment) typically managed by a broadband provider as the last connection point to the managed network (e.g. DSL modem, cable modem, satellite modem, ONT, etc.)
- 6** **Consumer device:** consumer device connected to modem through internal wire or Wifi (home networking), including hardware and software used to access the internet and process content (customer managed)