

BERECs Network Neutrality Measurement Methodology

and how it supports the EU's "Open Internet" regulation 2015/2120 (AKA Net Neutrality)

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Body of European Regulators
for Electronic Communications

BEREC

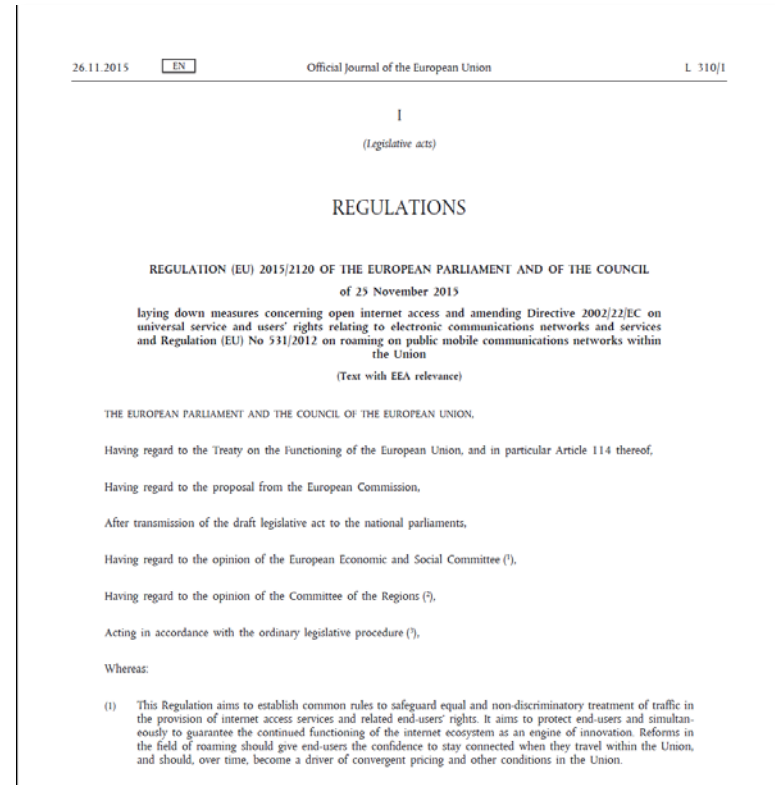
The logo for BEREC (Body of European Regulators for Electronic Communications) features the word "BEREC" in a bold, sans-serif font. The letters "B", "E", "R", and "E" are dark blue, while the "C" is a dark red. A thin, dark blue curved line starts under the "R" and sweeps under the "C", ending under the "C".

- Who am I?
- What is BEREC?
- A little bit about the Net Neutrality regulations
 - And the BEREC guidelines
- The BEREC speed measurement methodology
- Future plans

- The Body of European Regulators for Electronic Communications (BEREC) is currently in its 10th year
 - First established as European Regulators Group for electronic communications networks and services as an advisory group to the Commission in 2002
- Currently the BEREC Chair is held by ComReg, Ireland
- Consists primarily of Expert Working Groups (EWGs) populated by members from National Regulatory Authorities (NRAs), which create Reports, Opinions, Common Positions, Guidelines etc. which are approved by the Board of Regulators (BoR)
- NRAs and the Commission have to take utmost account of any opinion, recommendation, guidelines, advice or regulatory best practice adopted by BEREC.
- Supported by the BEREC Office in Riga, Latvia
- Overarching objectives
 - Promoting competition and investment
 - Promoting the Internal market
 - Empowering and protecting end-users
- BEREC's strategic priorities for 2018-2020 contain "*Fostering a consistent approach of the net neutrality principles*"

About Network Neutrality Regulation 2015/2120

- Regulation 2015/2120 was published in Nov 2015, and came into force Apr 2016
 - EU Regulation = directly applicable
 - Articles 1–6 relate to Open Internet / Net Neutrality, remainder relating to RLAH
- In summary - what does it mean for?
 - end-users: right to use and provide applications
 - ISPs: shall treat all traffic equally (with few exceptions); obligations around transparency in contracts
 - CAPs: a level playing field
 - regulators: need to monitor and supervise



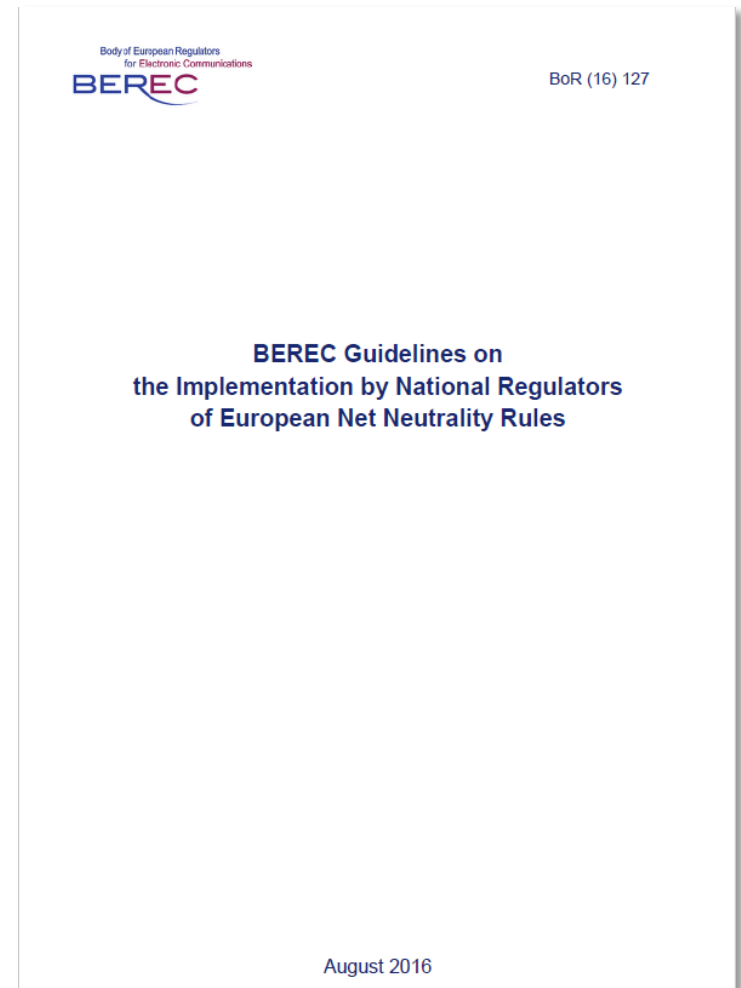
Article 3: “Safeguarding of open internet access”

- Article 3(1): defines end-users rights
 - “End-users shall have the right **to access and distribute information and content, use and provide applications and services**, and use terminal equipment of their choice, **irrespective of** the end-user’s or provider’s location or the location, **origin or destination of the information, content, application or service**, via their internet access service.
- Article 3(2): technical and commercial conditions can be agreed between telco and end-users, as long as these do not restrict the end-users rights
- Article 3(3): rules on treating traffic in the network of the ISP
 - “**Providers of internet access services shall treat all traffic equally**, when providing internet access services, without discrimination, restriction or interference, and **irrespective of the sender and receiver, the content accessed or distributed**, the applications or services used or provided, or the terminal equipment used”
- Article 3(4): processing of personal data only as necessary and proportionate
- Article 3(5): “specialised services”
 - “Providers of electronic communications to the public, including providers of internet access services, and providers of content, applications and services **shall be free to offer services other than internet access services which are optimised for specific content, applications or services, or a combination thereof, where the optimisation is necessary** in order to meet requirements of the content, applications or services for a specific level of quality”

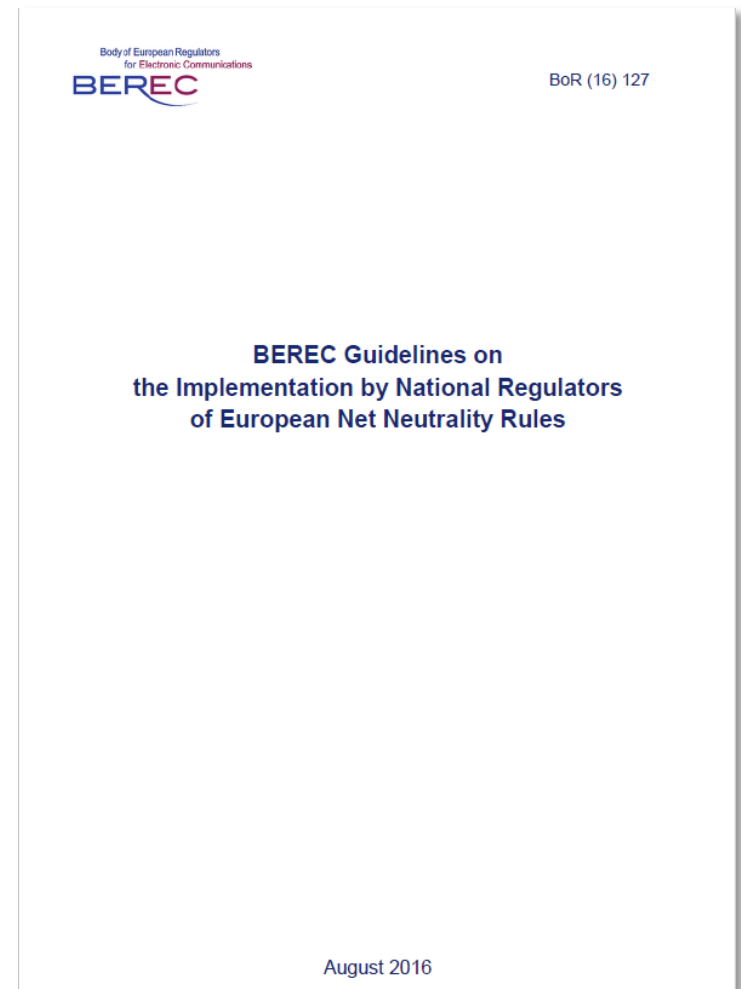
Article 4: “Transparency measures for ensuring open internet access”

- Article 4(1)(a-c): Information on the effect of any limitations to service
 - Traffic management measures
 - Volume, speed or other QoS limitations
 - Applied by that provider could impact on the quality of the internet access services
- Article 4(1)(d): “a clear and comprehensible explanation of”
 - “Providers of internet access services shall ensure that any contract which includes internet access services specifies [...] **a clear and comprehensible explanation of the minimum, normally available, maximum and advertised download and upload speed** of the internet access services in the case of fixed networks”
 - “.. or of the **estimated maximum and advertised download and upload** speed of the internet access services in the case of mobile networks”
- Article 5: Supervision and enforcement
 - “National regulatory authorities shall closely monitor and ensure compliance with Articles 3 and 4”
 - “By 30 August 2016, in order to contribute to the consistent application of this Regulation, **BEREC shall**, after consulting stakeholders and in close cooperation with the Commission, **issue guidelines** for the implementation of the obligations of national regulatory authorities under this Article.”

- 45 pages of guidelines covering all aspects of Net Neutrality requiring NRAs to take 'utmost account'
- Paragraphs 140 – 157 cover IAS upload/download speed
- Highlights
 - Paragraph 140: "Speeds should be specified on the basis of the IP packet payload or transport layer protocol payload, and not based on a lower layer protocol."
 - Paragraph 143: "The minimum speed is the lowest speed that the ISP undertakes to deliver to the end user"
 - Paragraph 147: "The normally available speed is the speed that an end-user could expect to receive most of the time"
 - Paragraph 149: "In order to be meaningful, it should be possible for the end-user to evaluate the value of the normally available speed vis-à-vis the actual performance of the IAS"



- (Further) Highlights
 - Paragraph 166: Following this existing guidance, the speed is calculated by the amount of data divided by the time period. These speed measurements should be done in both download and upload directions. **Furthermore, speed should be calculated based on IP packet payload, e.g. using TCP as transport layer protocol. Measurements should be performed beyond the ISP leg.** The details of the measurement methodology should be made transparent.
- New version of guidelines due in early 2020
 - For more information see “BEREC Opinion for the evaluation of the application of Regulation (EU) 2015/2120 and the BEREC Net Neutrality Guidelines” ([BoR \(18\) 244](#))



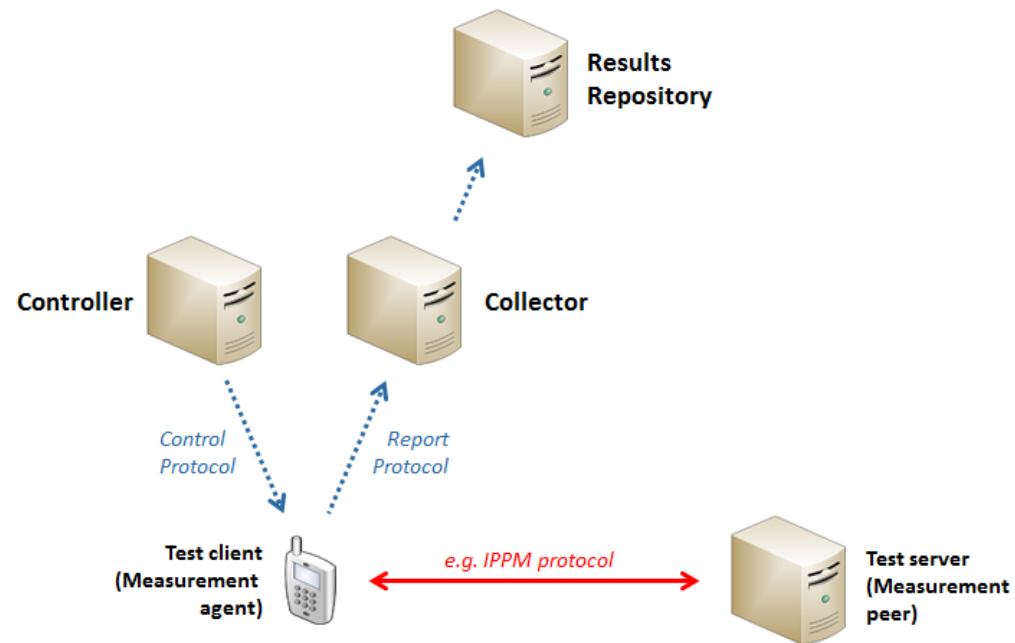
- Following the guidelines, BEREC commenced work on two documents
 - Net Neutrality regulatory assessment methodology ([BoR \(17\) 178](#))
 - Net neutrality measurement tool specification ([BoR \(17\) 179](#))

- High Level Vision

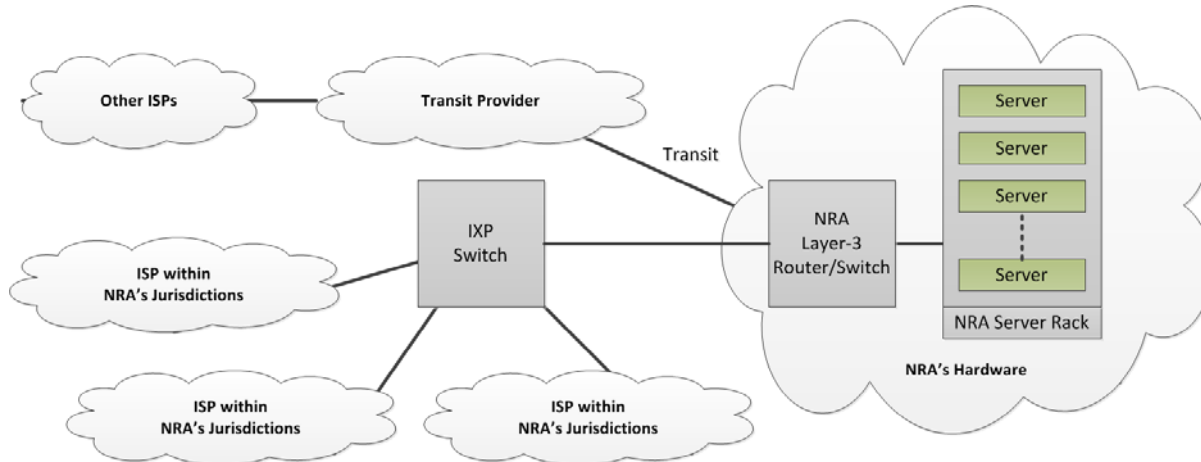
- Consumer friendly, facilitate end user measurements
- Based on LMAP specifications
- Open source / open data
- Clients – web browser, ios/android app

- Measurement Requirements

- Speed measurements (upload/download)
- Latency/delay
- Jitter
- Packet loss
- Port Blocking
- Various Application Specific Measurements (e.g. DnS manipulation, Proxy detection etc)



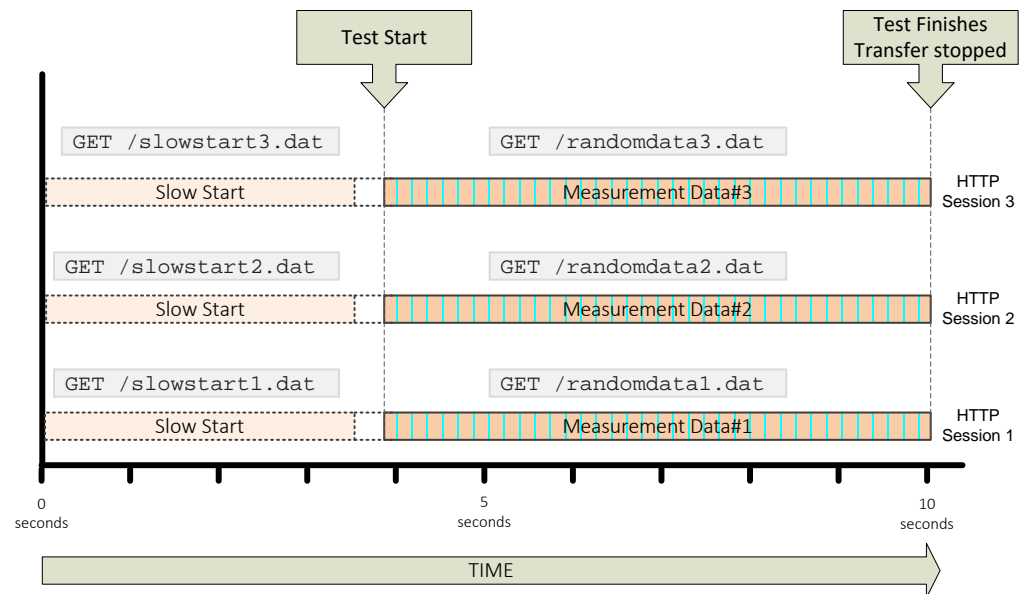
- Measurement made between both edges of the network
- Measurement Peer/Server should be ‘outside the IAS network’, with “adequate connectivity” “to avoid influencing measurements”. “the goal is to minimise latency added due to additional communication paths”
- Mobile connections may need a few seconds for resource allocation (and authentication etc)
- NRAs should seek to minimise the possibility that an ISP might be prioritising measurement traffic
- Avoid ‘confounding factors’ – e.g. home environment wi-fi, cross-traffic etc.



Regulatory Assessment Methodology

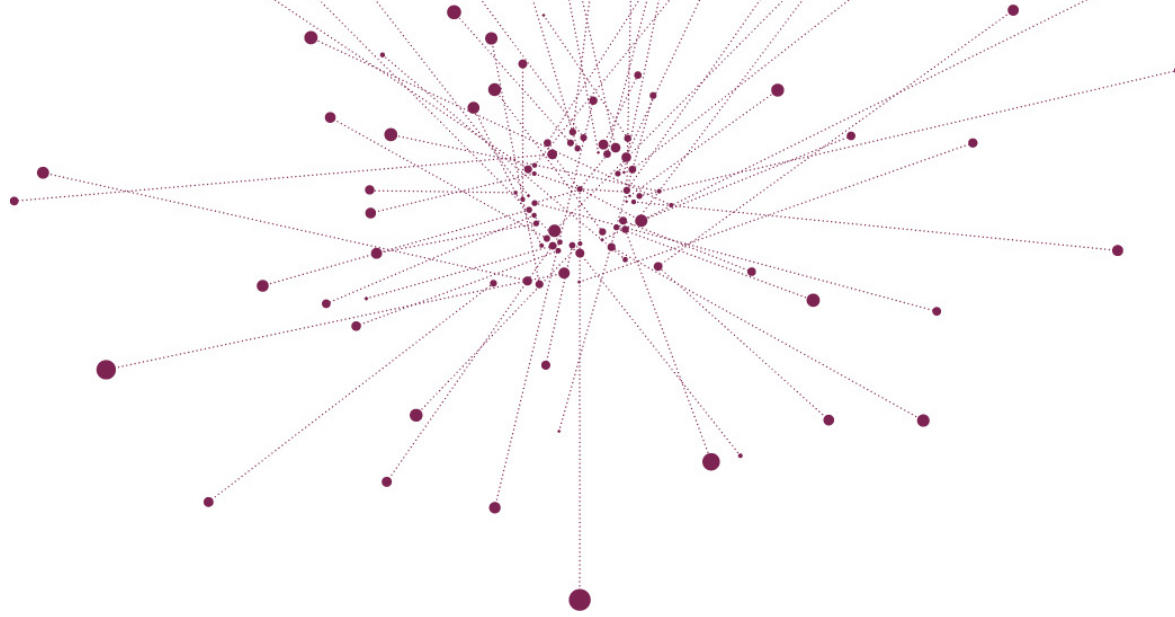
IAS speed measurements

- Testing based on HTTP transfers “to maximise compatibility in a real world environment”
 - Access to data on TCP payload size from all devices
 - Firewalls & Proxies
- Saturate the path
 - More than 3 HTTP connections
 - Chunked transfer encoding
 - Measure after TCP slow start phase completed
- Recognise that packet loss will affect throughput
- If necessary, convert TCP payload size to IP payload, assuming a 3% overhead
 - Rationale and calculation results included in section 3.1.3



- In March 2018, BEREC issued a call for tender ([Provision of Net Neutrality \(NN\) Measurement Tool](#))
- In August 2018, BEREC [announced](#) the results the competition
- Development is underway
- Scheduled completion of BEREC reference system before the end of 2019
- Subsequent national implementations likely to follow in due course

- In 2020, BEREC may revisit the measurement methodology based on experiences in developing the tool



Thank you!

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