Aalto University
School of Electrical
Engineering

EU Net Neutrality
A Hindrance to Innovation and Investment or Show Stopper in 5G Era?

Raimo Kantola
raimo.kantola@aalto.fi
Aalto University, Comnet, Finland

Talk at Levi IEEE 5G Summit, March 25th, 2019

Agenda

- What is Net Neutrality
  - *Purpose and origin of NN*
  - *EU Law*
  - *BEREC Guidelines*
- How does this relate to 5G
  - *Relevant Use cases*
  - *Questions to BEREC*
  - *What about consumers*
- What to do about NN?

BEREC= Body of EU Regulators for Electronic Communications

What is Net Neutrality

- **LAW:** Open Internet or Net Neutrality = ”ISPs should treat all *traffic* equally, without discrimination, restriction or interference, independently of its sender or receiver, content, application or service, or terminal equipment”.
  - E.g. forbids all filtering in the network (or MNO/ISP owned cloud)
  - Does not mention packet (except in “packet loss”)
- **Guidelines:** until Article 3.3 item 52 talks about “traffic”, from 53 talks about “*packets are treated equally*”, mentions that standard IP service is “best effort” (“packet treatment” = DSCP bits in IP)
- All deviations MUST be explicitly mentioned in LAW or guidelines: MUST be NECESSARY or OBJECTIVELY NECESSARY.

Why was NN defined

- **Goes back to ISPs vs Telecom Operators battles**
  - For purposes of content competition and services competition, boost innovation in Apps and benefit end-users → MUST carry all services/Apps equally to end-users.
  - A background aspect: natural monopoly in fixed telecoms
- **BUT Content delivery networks (CDN) have moved the battle lines elsewhere:**
  - CDNs are owned by US companies (except a couple), CPs can get better treatment for their content for money
  - CDN, Cloud services are not regulated at all; completely non-transparent to users and regulators alike

Why is NN strongly defended

- ***Human rights lobby*: talks about free speach as a reason not to let ISPs filter traffic (even for security)!**
- **My opinion: ISPs have *no business interest what so ever* to restrict free speach for the more people speak over the net, the more important is ISP service and the more money can be made.**
- **The threat comes from elsewhere!**
  - FB, Google algorithms have classified people and content and decide what to tell to whom → people are kept in likeminded bubbles = not all content is treated equally = threat to democracy

Impact on Value Added Security Services

- **ISPs, MNOs cannot proactively offer network or cloud based security services for a price**
  - All security filtering MUST BE NECESSARY
  - One can not differentiate on what is necessary
  - User consent is not mentioned as reason to deviate from equal treatment → forbidden to use it to filter traffic for security
- **”Cloud=Network” when it comes to ISPs and MNOs.**
  - When it comes to cloud services providers, their computers in the cloud are end systems and can run any unregulated SW!
  - ISPs, MNOs are prevented from fully benefitting from cloud technology!

NN → Security + Internet Access Providers

- ISP or MNO is not allowed to
  - Favor one type of packet or flow over another
  - Filter packets BUT there are regulated exceptions e.g. for security
    - If for protecting Network or end system security filtering is **necessary,** it can be done as instructed by the NRA (or CERT)
    - E.g. parental control is not an allowed service to MNOs and ISPs
    - **User consent is not enough** to allow filtering in the network
- Result is that ISPs/MNOs are forced to take a passive attitude to end system security and do just what the regulator tells them to do; it is not feasible to try to earn money from network or cloud based security services provision

Open 5G opportunities under EU Law

- **Machine to machine** is out of scope of NN
  - SmartGrid, Automated Driving Support?
- ”***Special services***” – e.g.
  - Healthcare etc.
  - BUT: what does qualify as Special Service is not clear to MNOs and ISPs →uncertainty → hindrance to innovation and investment
- A user device can be ***connected to VPN*** that can provide access to Internet but not as an open Internet replacement service
  - A private company or non-regulated *service provider* could use cloud based security…

NN

- **Equal treatment of traffic**
  Best effort for all

5G

- **Tailoring of network to use case by**
  - Traffic management (QoS)
  - Resource allocation
  - Edge computing
  - Level of Redundancy
  - Security

Network philosophies are fundamentally at odds. However, 5G for *verticals maybe can* follow the idea of tailoring. BUT slicing for consumer services is not allowed!

NN and 5G URLLC remote access

- URLLC slices will need remote access for Admin
  - The best specialist need to be able to help with operations, problems irrespective where he/she is → Use the Internet
  - There will be an attack surface either in the operations center and/or on the device the specialist is using.
- While the rest of the Internet is as today
  - There is no security certification of consumer gadgets
  - These will remain the attack resources
  - This could be patched using cloud technology BUT this scales only in case ISPs/MNOs can do it. They are not allowed by NN!
  - Result will likely to be < URLLC!

NN and 5G – Edge Computing

- **5G supports MEC: it is useful for some services but not to all. → MEC == unequal treatment of packets**
- **Because of NN requirement of equal treatment**
  - Is MEC compulsory for all services even if they do not need it?
  - Should MEC be banned under NN for MNOs, because it favors the services that can benefit from it – so it is against the the idea of NN?
  - Could be provided by cloud companies (FB, AWS, Google etc) – then there is no problem because there is no regulation!??
  - May be the trouble is that NN is defined in a technology dependent manner?

NN – 5G -- Virtualization

- **5G heavily uses virtualization – leads for ISPs and MNOs to need to invest into ”cloud technology”**
  - On cloud platforms it is possible to give control on type of computing to end users; has never been feasible with vertically integrated network products.
  - MNOs can save money by new technology.
- **MNOs can not use the cloud platforms *to offer native cloud services to consumers* and compete against US cloud companies, because**
  - if owned by ISP or MNO **cloud platform = network** BUT when owned by FB, Google et al, it is not a network but end system.
  - Trying to compete against the cloud companies is like going to a Ring with one hand tied behind your back.

Conclusions on NN Law in Europe

- **Obsolete in terms of technology, use cases and business landscape**
  - The concept of tailoring of network to use case in 5G is against NN principle (and unlawful in case of consumer traffic)
  - Regulation raises uncertainty:
    - How to offer Edge computing functions to users is open!
    - What qualifies as Special Service is open!
  - URLLC can be attacked from the rest of the Internet that is under NN: consumer gadgets (etc) with poor security may be a threat to URLLC
  - None of the cloud players are European and Europe has the most favorable law for them: regulators eyes are on MNOs rather than FB or Google!

Conclusions on impact of NN (1)

- *Discourages innovation* in basic networking technology
- *Stops innovation* in native cloud based services by operators to consumers
- *Creates uncertainty* for 5G investments → *discourages* innovative use of 5G technology
- *Restricts* consumer choice in its present form

Conclusions on industry structure

- NN ties the hands of MNOs and ISPs in the battle against FB, Google, AWS etc cloud companies which are private de-factor monopolies while MNOs/ISPs have lost all natural monopoly status
- Paves the way for AWS and the like to take over some MNO turf
- Paves the way for cloud companies to grap IoT data under unregulated licenses and keep segmenting people – Privacy problems will become ever bigger!

What should 5G industry do about NN in EU?

1. Use the exceptions in NN law to build tailored solutions for verticals meeting ideally the requirements. Refine the tailoring methods, technologies and practises
2. Push to Rewrite/Modify the Guidelines that are obsolete at the face of technology turning to virtualization and tailoring; Probably changes would be needed in the law too.
3. Follow the US example and get rid of NN.
   - Maybe generic competition law is enough??

Thank You (Questions? )

A”