

Network of the Future 2017, London

Panel: Will IP support the networks of the future
or do we need something better or different?

IP over ICN

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Networking in the old days

- Computer networks were first developed for mainframes (in the picture ENIAC and IBM S/360)
- Goal: To share devices (computers, printers, mass memories etc.) identified by their addresses
- Traffic: Point-to-point between two machines
- The networking paradigm still lives, even though the world has totally changed

=> Major problems

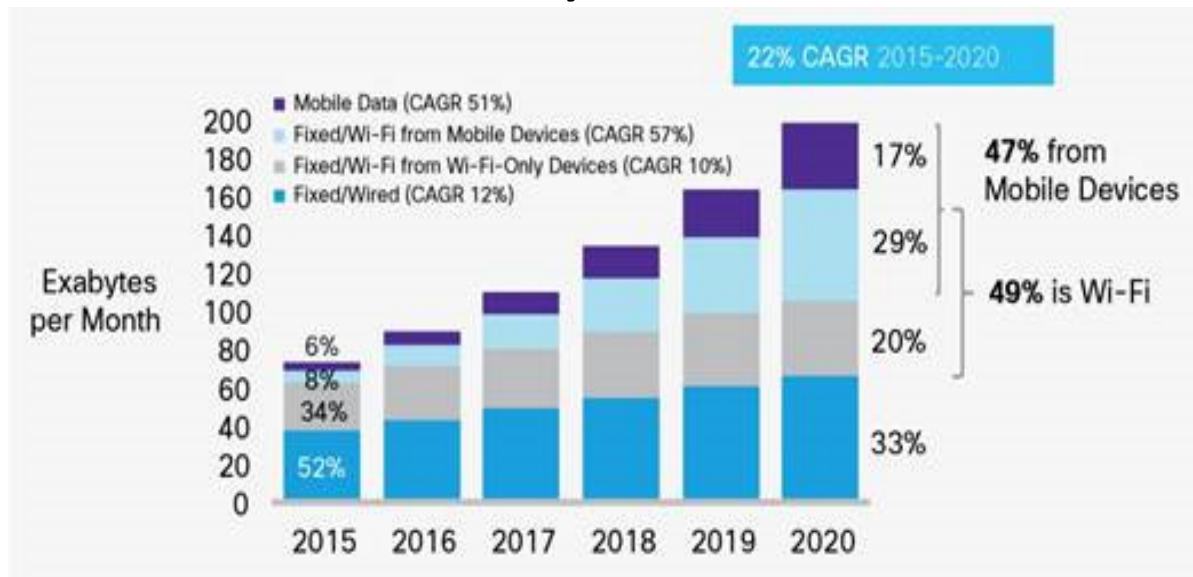


Problems of the Internet

- Historical problems:
 - Mobility
 - Security
 - Multi-homing
 - Multicast
- More recent concerns:
 - Undesirable traffic
 - Denial-of-Service attacks
 - Efficient distribution of digital media
- Throughout its history the Internet has only just worked (see: *Why the Internet only just works*, Mark Handley, BT Technology Journal 24(3):119-129 · July 2006)
- The Internet will not collapse but many researchers believe that some fundamental reforms will be needed

The Internet in 2021 (Source: Cisco VNI, 2017)

- Annual global IP traffic will grow from 1.2 ZB in 2016 to 3.3 ZB by 2021 (ZB = zettabyte = 1000^7 bytes = 10^{21} bytes)
- Busy-hour traffic is growing even more rapidly
- IP video will be 82% by 2020 (73% in 2016)
- CDNs will carry 71% of the traffic by 2021



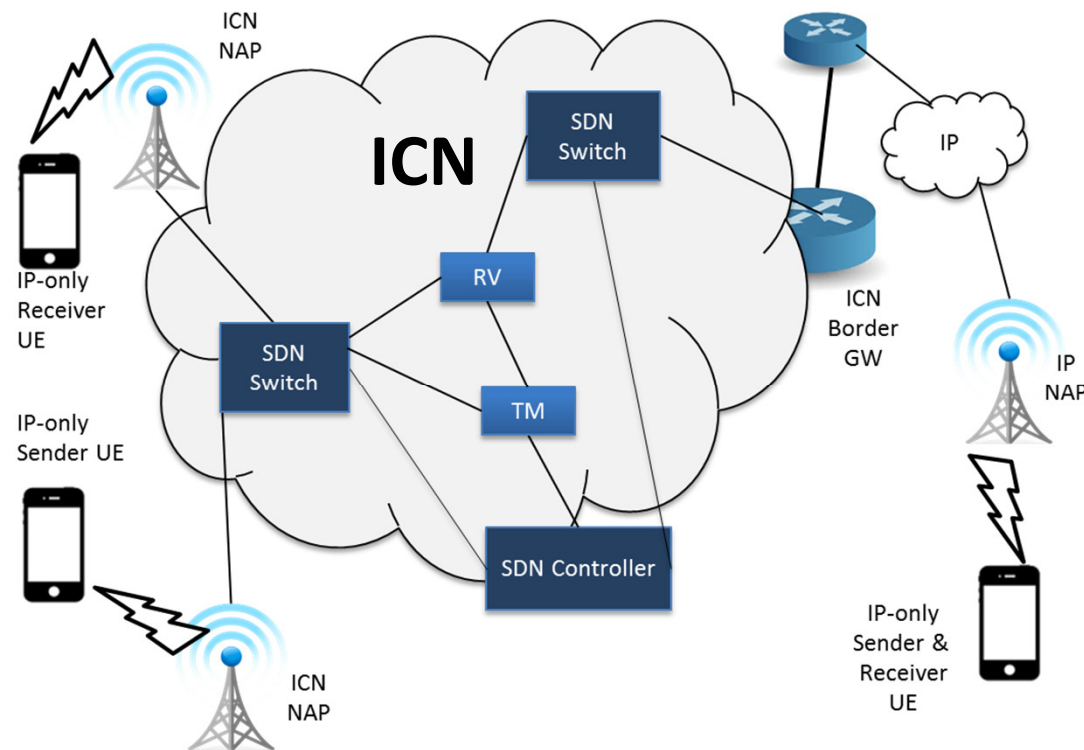
Year	Global Internet Traffic
1992	100 GB per day
1997	100 GB per hour
2002	100 GBps
2007	2,000 GBps
2015	20 TBps
2020	60 TBps

Information-Centric Networking

- People are increasingly accessing information instead of machines
- The most important applications already are essentially information-centric in nature (video streaming, social media updates, news items)
- The network should directly support accessing information – no matter where it is located
- In an information-centric network (ICN) we address information – not hosts:
 - Each information item has a unique label (“name”)
 - Network returns an information item by the name

POINT: iP Over IcN - the betTer ip

In the ongoing EU H2020 project POINT we are running unmodified IP applications on ICN over the underlying SDN infrastructure



The POINT Solution

- Extensive use of multicast leads to scalable and adaptive content delivery
- No modification of applications
- No modification of terminal devices
- No investments in specialized hardware
- POINT is being demonstrated for example at:
Bristol Is Open – Open Programmable City
<https://www.bristolisopen.com/>
- More information:
<https://www.point-h2020.eu/>

Conclusions

- The Internet has grown well beyond what anybody could foresee – and it continues growing
- Something fundamental needs to be done at some stage to address the major problems
- Today's applications are information-centric and probably the network should be too
- CDN-like functionality can be built into the net
- Pub/sub is essentially receiver-centric which should help us fight SPAM and DoS
- A big challenge is the migration path to ICN
- POINT provides a natural migration path