RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Emerging Technologies

Behind the Hype

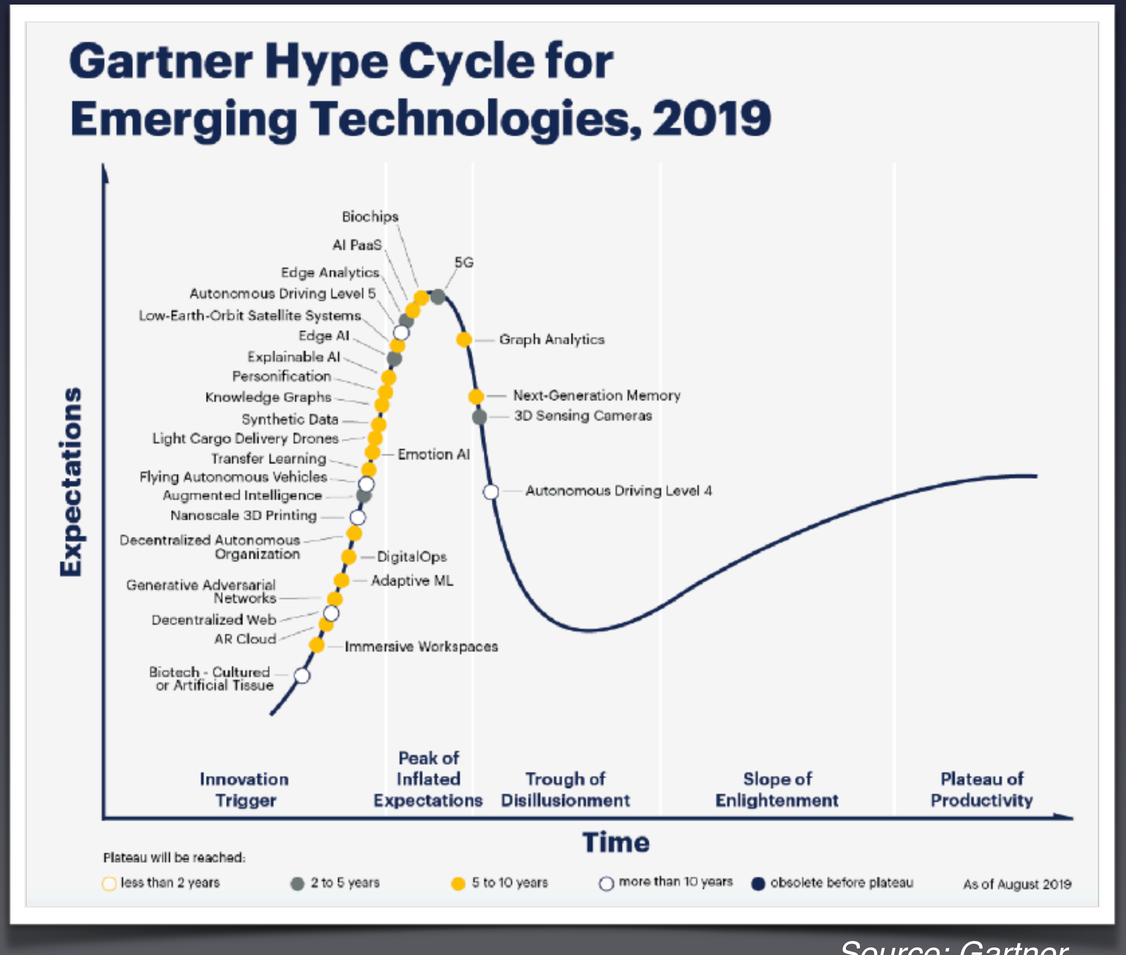
Marco Hogewoning | RIPE NCC Roundtable Meeting | 27 January 2020

Background

What we see, hear and think

Emerging Technologies

- Everything AI
  - Foundation under IoT
  - Driver for big data
- Distributed Ledger Technology
  - Blockchain for you and me
  - Path to decentralisation
  - Driver for disruptors
- Quantum Computing
  - Great opportunity
  - Massive threat



Source: Gartner

Quantum Computing

- Promises unprecedented increase in computing power
  - Theoretically has no limits to its applicability
- Best known for its use in cryptography
  - Quantum-based crypto will be really hard (impossible) to break
  - Renders most of the known cryptography completely useless
- Long term, this is a big concern for our industry
  - DNSSEC, RPKI, TLS all need to evolve and incorporate quantum-proof cyphers
- Academics are already studying “quantum Internet”
  - We have an ongoing relation with the team at TU Delft

Distributed Ledger Technology

- Probably already passed the peak of expectations
  - Bitcoin itself and many dubious ICOs did not help its reputation
  - Pending (financial) regulation appears to act as a filter
- Feeds ideas to decentralise the Internet
  - Still a number of academic studies looking to replace DNS, registries and routing
  - Appeals to people who do not like the current arrangements
- The Internet industry at large is skeptical
  - Concerns include environmental sustainability, cost and scalability
  - Ledgers being immutable could actually be a real problem

Artificial Intelligence and Big Data

- Very broad field of applications and use cases
  - Often fancy package around existing algorithmic programming (“smart X”)
  - Truly self-learning neural networks still in early phases
- Common use in content networks
  - Amazon and Netflix recommendations
- Starts to find its use in network technology
  - Evolving software-defined networking can be considered a form of AI
  - Self-organising networks in IoT and low-Earth-orbit satellite constellations
  - Radio technology in WiFi and 5G adapting to its environment

What about 5G?

- Current deployment in market is the radio layer
  - Spectrum, masts and coverage not in RIPE NCC mandate or area of expertise
  - But we have to consider that these licenses have a long lifetime
- Work continues to develop the networking layers
  - We are keeping an eye on those developments
  - Many in the technical community are skeptical on what they consider “marketing talk”
- Biggest potential for us to increase IPv6 deployment
  - Rebuilding or upgrading the network core is a great opportunity
  - Growth without IPv6 is going to be a big and expensive challenge

Risks Concerning 5G

- Expectations probably exceed the (technological) possibilities
  - Technical community sees opportunities, but is also very realistic
  - Unfeasible proposals are shopped around different SDOs
  - Time to market and costs are serious threats to its high ambitions
- Consolidation and openness
  - Network virtualisation can easily create walled gardens or affect net neutrality
  - High development costs that only big players can afford
- Geopolitical concerns around national security
  - High risk of spilling over to non-mobile operators and ICT sector in general

RIPE NCC Position

The Internet is the Foundation

- No matter the technology or application, it all relies on TCP/IP
  - The Internet is the only truly global network, with cheap and ubiquitous connectivity
  - The modular design and open standards allow it to accommodate these new ideas
- For any emerging technology to succeed, you need the Internet
  - Make sure it remains the stable, reliable and open platform it is today
  - Protect crucial parts - the “public core” such as DNS, routing and the registry system
  - Be very careful when making changes to its governance and trust models
- Recognise the need to evolve and adapt to new use cases

The Internet Protocol Layers

- IPv6 is the only realistic option for sustainable growth
  - IPv4 will be around, but we need to stop depending on it
- Our main arguments for IPv6 adoption:
  - Removes financial barriers to new market entrants
  - Treating IPv4 as an asset creates huge risks
  - Exacerbates the digital divide between developed and developing world
- Be realistic in what to expect
  - Certain applications might not benefit from using TCP/IP, eg. sensors and vehicles
  - Some people take “all IP” too literally

Sustainability

- The industry is becoming increasingly aware of its impact
  - Lowering energy consumption has always been a great way to reduce costs
- RIPE NCC is also taking small but important steps
  - Lowering our environmental impact, including for RIPE meetings
- Working towards the UN's Sustainable Development Goals
  - WSIS action lines include access, but also building national strategies
  - We contribute our expertise when relevant
  - Think about how our measurements and analyses can be useful

Engagement

New Decade, New Milestones

- EU: Horizon 2020 rolling into Horizon Europe
- ITU: IMT-2020 turning into Network 2030
- UN: 2030 Agenda for Sustainable Development
  - Not new, but awareness is increasing
  - WSIS outcomes target 2025 and directly link to SDGs agenda

ITU: WTSA-20

- World Telecommunication Standardisation Assembly
  - Sets agenda for the next four years in ITU Telecommunication Standardization Sector
  - 17-27 November in Hyderabad, India
- Preparations in full swing at ITU-T and CEPT
  - We participate in the discussions via a number of groups
  - Our key objectives are to keep ITU within mandate and reduce pressure on resources
  - Focus on telecommunications; reduce and prevent overlaps with other organisations
- Emerging technologies play a big role
  - Seen as a chance to expand or renew ITU mandate as SDO
  - Risk that this leads to state-controlled and multilateral governance models

ITU: WTPF-21

- World Telecommunication Policy Forum takes place in May 2021
  - Develop and publish non-binding policy recommendations on telecommunication/ICT
  - Focus on mobilising new and emerging technologies for SDGs
- Preparations take place in an informal expert group
  - RIPE NCC is a member of the IEG
- Discussions currently focus on scope
  - “New and emerging telecommunications/ICTs” vs "new and emerging technologies”
  - If and how to include things like 5G, quantum, AI and big data
  - We are firm on keeping to telecommunications and suggest including IPv6

ITU: CWG-Internet

- Recent open consultation overlapped with WTPF theme
  - Both asking about the role of emerging technologies in contributing to SDGs
- Our response included:
  - A well-functioning Internet is key to success
  - The need to accelerate IPv6 adoption
  - Several examples from countries in our service region
- Calling to develop and exchange best practices on IPv6
  - Removing barriers to adoption
  - Public-private cooperation to coordinate and stimulate industry to deploy

Our Message to the IoT Sector

- Same as before: Make sure to include IPv6 support
  - We accept that IP technology might have too much overhead
  - Ensure compatibility and interoperability; don’t abuse the “brand name”
- Fix your security and threat models
  - The Internet is a public network - you are responsible for securing the devices
  - Security is much broader than data and privacy
  - Make sure your devices can’t attack others or the core infrastructure
- Respond quickly and adequately to security and bug reports
  - Cooperate and learn from our experience and mistakes

Re-inventing the Internet

- Several groups have proposed radical changes to the Internet
  - Recently China and industry partners voiced ideas at ITU and IETF
  - Other smaller but similar ideas still around: IPv10, E.164-based addressing and DLTs
- Engineering is usually flawed or extremely ambitious
  - It is very unlikely these ideas would work or be an improvement
  - Technical community is often quick to discard and walk away
- It answers to political ambitions or agendas
  - This is much harder to challenge
  - Technical and political dichotomy on privacy and security

Questions

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