The environmental sustainability of the Internet for all and everything

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Situation

- More than 6 billion new ICT goods are sold annually worldwide, and beyond 28 billion are expected in 2025.
- Can we afford the growth of ICT devices for more people (everyone), more devices per person (mobiles, laptops, desktops, servers, cloud providers, the internet, mobile networks), more IoT (everything).
- ... and the energy spent in all we do on the Internet?
- Climate change and environmental degradation are an existential threat to the world.
- Decarbonisation: reduction of green-house gas (GHG) emissions.
Goals?

- Reduction of environmental impact of about 50% by 2030 to align with the 1.5°C trajectory, or the 2°C severe effects, or ...

- Contribution of ICT in electricity usage is a major green-house gases factor:
  - By 2030 it could use up to 51% of global electricity, and contribute up to 23% of globally released GHG emissions

GHG emissions across the life cycle of a smartphone


The global warming potential for a mobile phone with two year usage life-cycle

Questions

- Fast-forward 10 or 20 years, can we imagine a scenario by 2030 or 2040?
- How to achieve a desirable scenario?
- Need for changes on how the Internet works?
  - Architecture: caching, replication, locality, asynchrony, slower
  - Protocols: format, overhead reduction, slowdown
  - Formats: less verbose, compression
  - Parameters: timers, negotiation
### Environmental protocol considerations: energy

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<tr>
<th>RFC</th>
<th>Standard Type</th>
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Even more ...

- Locality of edge/fog computing?
- Servitised user-devices: light clients (xterminal like)
- Env accountability:
  - GHG metering, reporting: per device, per org
  - Circular economy: reuse of devices (2nd hand): traceability from manufacturing until final recycling
  - Environmental limits, env budget? Environmental congestion control, caching, rate/update limits?
Lessons, actions

- GAIA! Network + end-hosts + people + things + environmental limits
- Sustainability: the Internet adds or subtracts on GHG Better materials, better energy, more durable, less usage ...
- Lightness: materials, energy, processing, data, ...
- Locality of data and computation, caching, replication, slower by design or choice (asynchrony), limits ...
- Any lesson from COVID?
- How to turn into IRTF research, discussion, documents