

High-Level Conclusions

NEED TO BE REVISED LATER

Jari's conclusions

- The workshop clearly believes that there's a need for Internet technology to both
 - help other areas of society in reducing the overall environmental impacts, and
 - do everything we can to help reduce Internet's own environmental impacts.
- These are very important tasks, though not entirely new for the Internet or the IETF:
 - video conferencing technologies developed at the IETF, for instance, helps avoid unnecessary travel, or
 - the focus on low-power and long-lifetime devices in IETF's Internet of Things work.
- But of course, the Internet can also have negative consequences, from excessive consumerism or e-waste to energy consumption.

EARLY CONCLUSIONS, WILL

- Even just one angle of this, energy consumption, can be a complex topic.
- One of the key take-aways is that we need more data and better understanding.
- Nevertheless, the road ahead for making improvements seems clear:
 - we need to continue to improve our understanding of the environmental impact,
 - have a continuous cycle of improvements
 - Ongoing and starting activities in the IETF are part of those improvements, but of course this is a broader change involving components, energy sources, business practices, implementation techniques along with communication protocols.
 - support research for more forward-looking ideas
- The discussion at the IETF will continue after the workshop, both around specific proposals as well as general discussion. A report from the workshop is under preparation.

Detailed Conclusions.

TO BE REVISED LATER

Observations

- We need to be better aware of sustainability issues
- We need to understand in detail where we are, and what are the causes for main emissions, for instance.
- There's momentum in this topic, and this can be used to make improvements
- Continuous improvement & influence is important. We should not expect quick, large changes. But
- We need to understand design tradeoffs
- We need to understand how Internet can help the society
 - It is important to find out where our help would bring most benefits, such as with internet connected electronics

Useful tools

- We also need to remember measures beyond protocol design, such as implementations or renewable energy use. Not everything is about protocols.
- Metrics, measurements & data are very beneficial
- It would be beneficial to be able to provide various systems a more dynamic ability to slow down & sleep
- Possibly there's a new opportunity for deploying multicast?
- When we design systems, paying attention to the used data formats may pay off significantly.
- Carbon-aware metrics & QoS are useful
 - This information allows us to do time and place shifting
 - Possibly leading to carbon-aware routing, transport, TE, ...

BUILT LIVE DURING SESSION 4, WILL NEED

- Design for energy constrained situations, and your designs may work also elsewhere
- Optimization & AI adjustments based on metrics

Actions that we should take

- Continue the discussion – not all questions are answered
- Connecting IETF with others in society & other SDOs
- Find a role and a scope for IETF work in this area
- IETF activities on specific technologies are already ongoing/starting
 - Such as metrics, or the new TVR proposal
- Pick the low-hanging fruits
 - Lengthy formats, crypto-assets, non-renewable energy

Goals that we should have

- Full understanding of Internet's impact
- Continuous improvement

Research that needs doing

- More measurements and data
- Various advanced improvement technologies
- Understanding the impact of improvements
- Business-related issues, such as how peering or advertising should work in a carbon-aware world

Next steps in the workshop

- Discussion on the list should continue!
- A draft report will be prepared (help appreciated)
- Discussion at the IETF-116 IABOPEN session
- Improvements will progress independently: metrics, implementations, TVR, etc.
- Maybe something else as well? (your idea here)
 - “Sustainability considerations & tradeoffs” document
 - A new working group “e-interest group”?
- How did this workshop go? Comment in chat or email to Jari & Colin