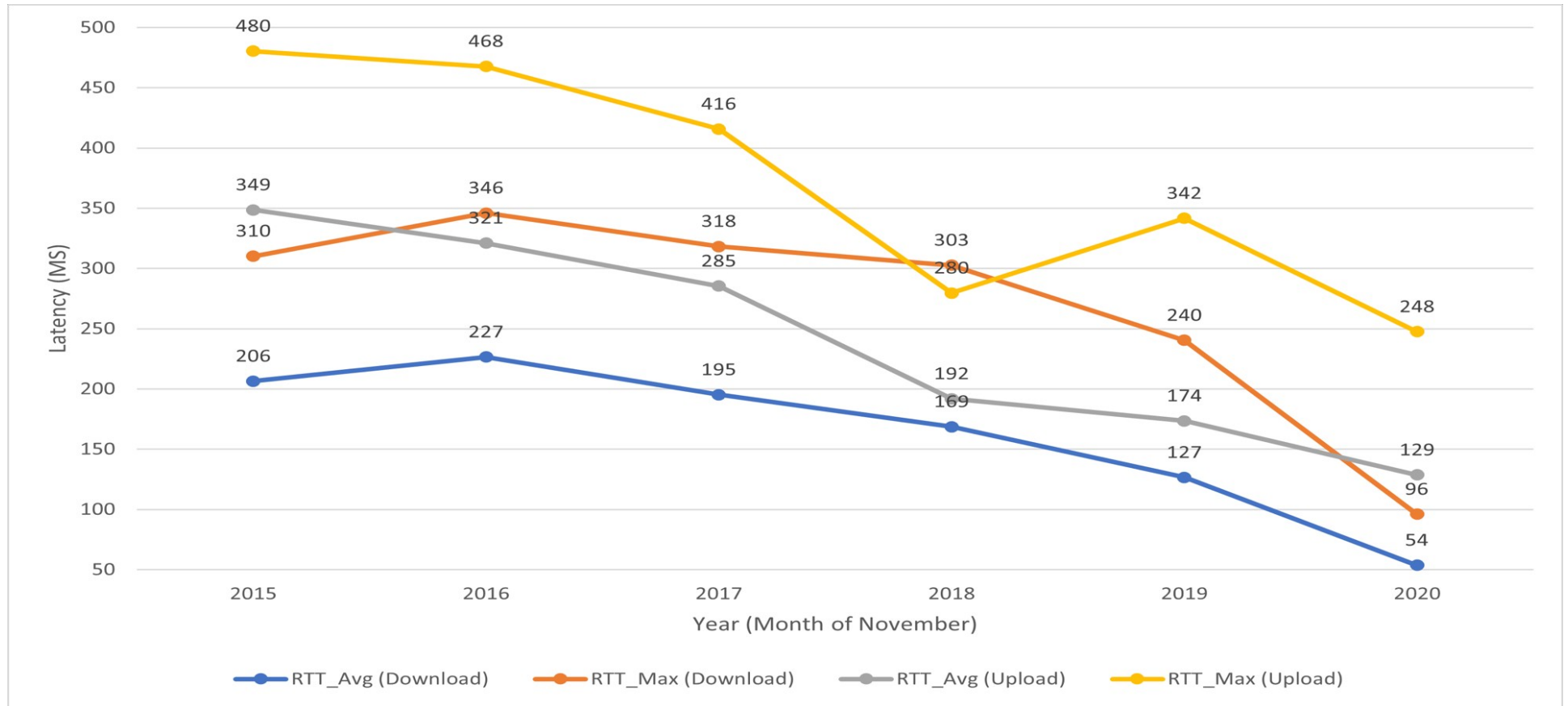


IAB workshop report  
Measuring Network Quality for End-Users

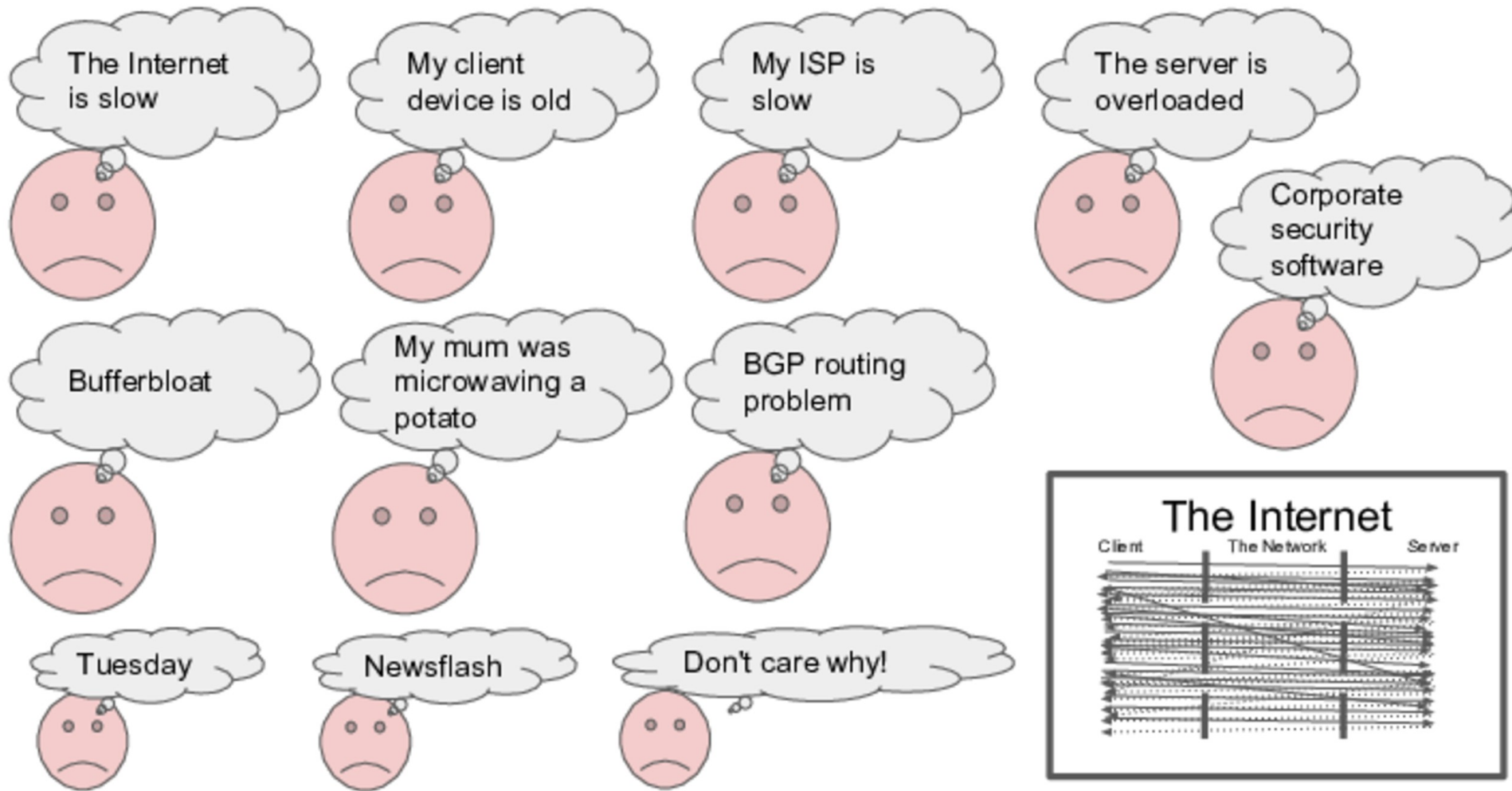
# Background

- World connectivity has gotten significantly better
  - Yet we all experiences local outages/issues
  - Inter-application resource competition
- Identifying the problem spaces
  - What is a good user experience?
  - How can we measure this?
  - How can we communicate these measurements?
  - How can measurements be made user understandable?

# FCC's Historical Latency Under Load Data Over Cable (Longitudinal Average RTT, Comcast, 2020)



*Slide courtesy of workshop participant David Reed*



*Slide courtesy of workshop participant Lucas Pardue*

# Workshop Details

- The IAB held a workshop:
  - Virtually via WebEx
  - September 14 – 16
- Details
  - 4 hours a day
  - Plus an hour+ of side-channel discussions
  - 90 attendees total, ~76 at one time
  - 3-4 short 5-minute presentations with clarifying questions
  - ~30 minutes of discussion time

# Workshop Details

- Topic breakdown:
  - Introduction and background presentations
  - Metrics considerations
  - Cross-layer considerations
  - Synthesis
  - Group conclusions

# Conclusions

- As a group we took 30 minutes to:
  - Make statements people thought had consensus
    - 24 sentences documented
  - Ask clarifying questions about them
- 30 minutes to rebut or slightly alter them
  - Eliminated 5 as not achieving consensus
- I later grouped and added context for the ID report

# General Conclusions

- **Bandwidth is necessary but not alone sufficient**
- In many cases, Internet users don't need more bandwidth, but rather need "**better bandwidth**" -- i.e., they need other improvements to their connectivity.
- We need both **active and passive measurements** – passive measurements can provide historical debugging.
- We need passive measurements to be continuous and **archivable and queryable** – include reliability/connectivity measurements.
- A really meaningful metric for users is **whether their application will work** properly or fail because of a lack of a network with sufficient characteristics.
- An useful metric for goodness must actually **incentive goodness** -- good metrics **should actionable** to help drive industries toward improvement.
- A lower latency internet, however achieved would **benefit all end users**.



# Specific Statements

- **Round trips Per Minute (RPM)** is a useful, consumable metric
- We need a usable tool that fills the current gap between network reachability, latency and speed tests.
- End-users that want to be involved in QoS decisions should be able to voice their needs and desires.
- Applications are needed that can perform and report good quality measurements in order to **identify insufficient points in network access**.
- Research done by regulators indicate that users/consumers prefer **a simple metric per application**, which frequently resolves to whether the application will work properly not.
- New measurements and QoS or QoE techniques should not rely only or depend on reading TCP headers.
- It is clear from developers of interactive applications and from network operators that lower latency is a strong factor in user QoE. However, metrics are lacking to support this statement directly.

# Problem Statements and Concerns

- **Latency mean and medians are distractions** from better measurements.
- It is frustrating to only measure network services without simultaneously improving those services.
- Stakeholder incentives aren't aligned for easy wins in this space.
- Incentives are needed to **motivate improvements** in public network access. Measurements may be one step toward driving competitive market incentive.
- For future-proof networking, measuring **ecological impact** of measuring material and energy usage is important.
- We do not have incontrovertible evidence that any one metric (e.g. latency or speed) is more important than others to persuade device vendors to concentrate on any one optimization.

# Future Work

- Document the workshop:
  - draft-iab-mnqeu-report
  - <https://www.iab.org/activities/workshops/network-quality>
- Bring work forward
  - Immediate tasks to existing IETF WGs
  - Research tasks to the IRTF