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Communications, Space &
Technology Commission

Internet Services QoE Measurement and Improvement

Maan AlMajed

Internet Services Development - CST

Recommended Speeds for different services

3 Mbps

High definition
(720p) bandwidth*

5 Mbps

Full High definition
(1080p) bandwidth*

15 Mbps

Ultra high definition
(4K) bandwidth*

15 Mbps

Cloud Gaming in
720p at 60 FPS
bandwidth**

45 Mbps

Cloud Gaming in 4k
at 120 FPS
bandwidth**

186 Mbps



Average Mobile internet speed in
Saudi Arabia (2023 Q1)

* Based on recommendations by Netflix, a video on demands service

** Based on recommendations by Nvidia GeForce now, a cloud gaming service

The importance of lower latency vs higher bandwidth on quality of experience.

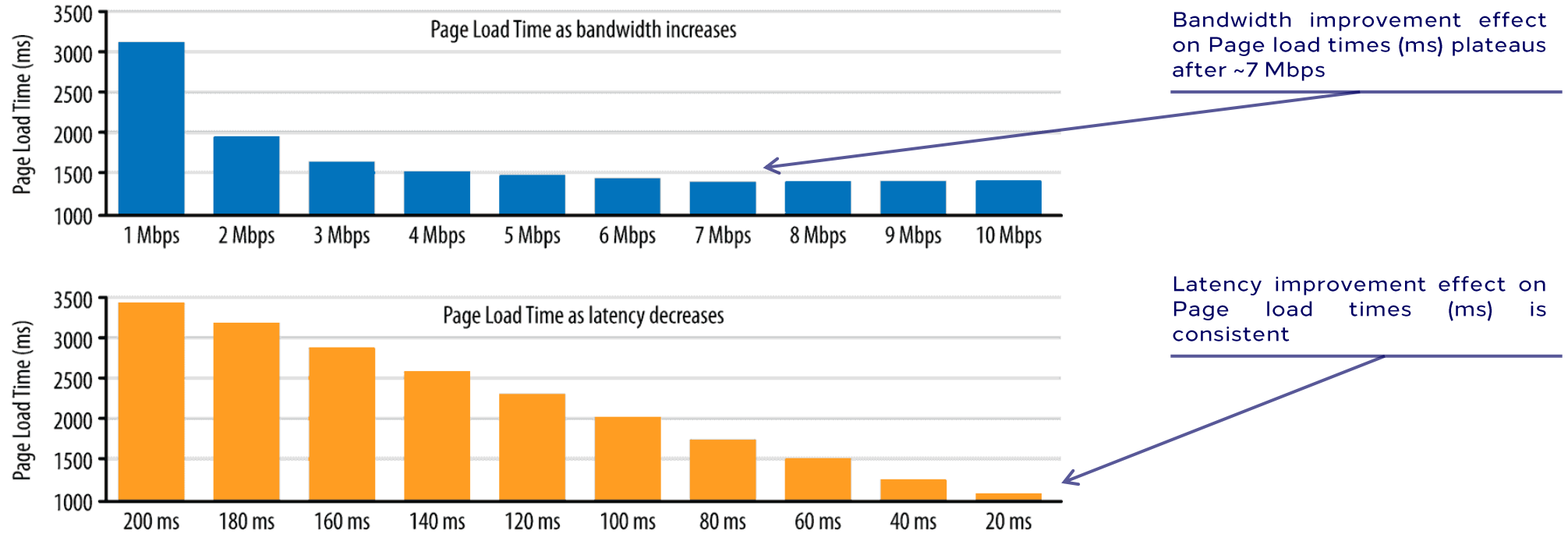
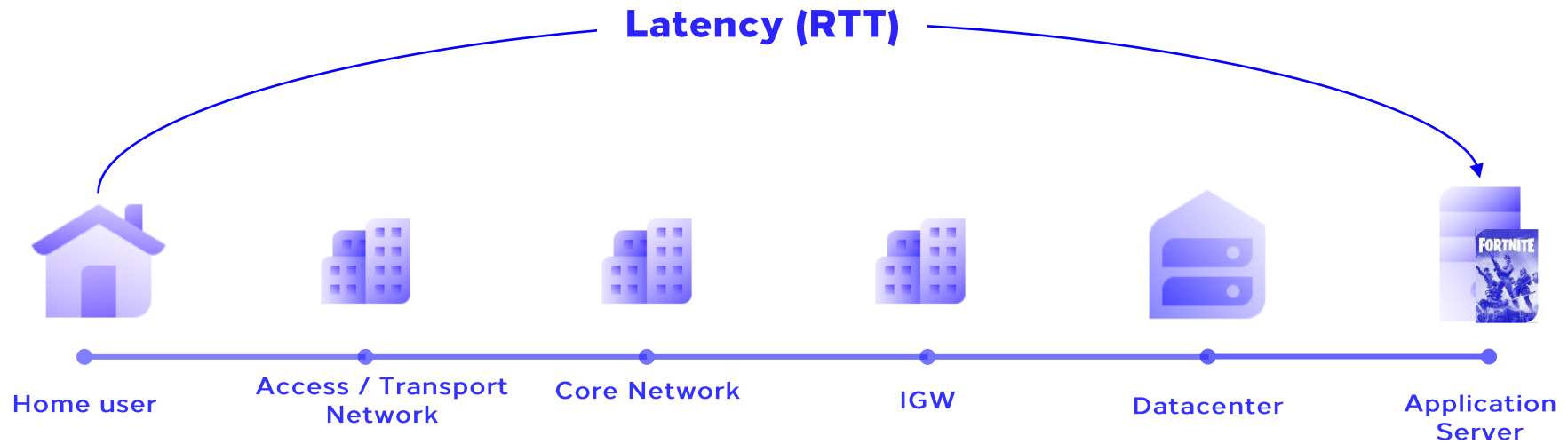


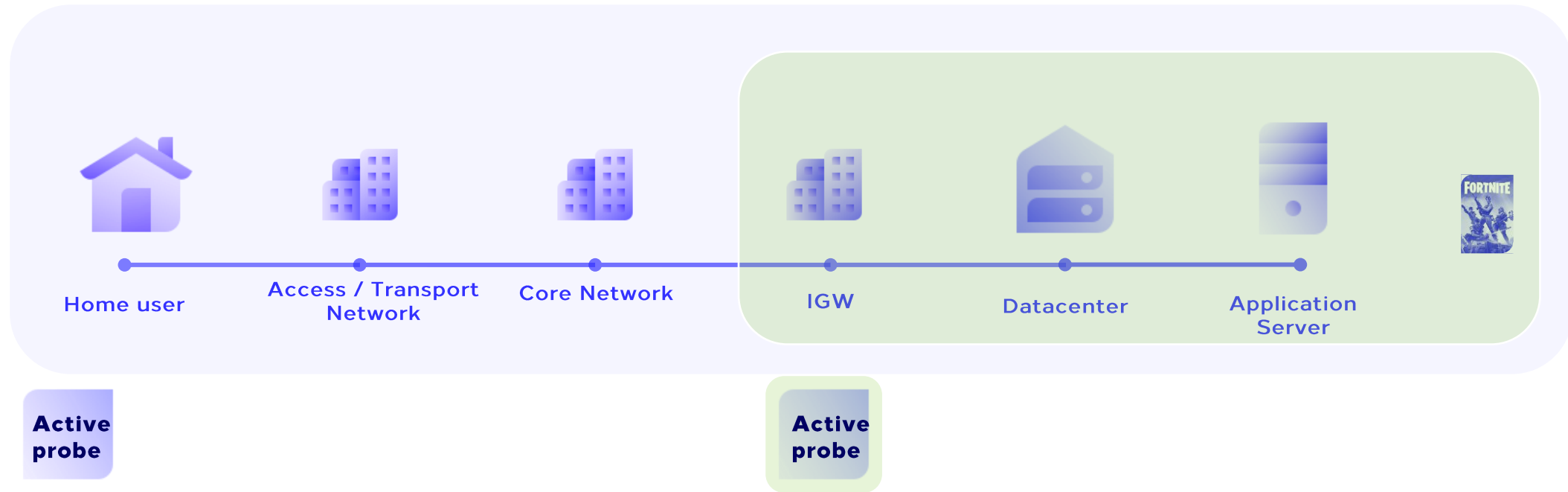
Figure 1. Page load time vs. bandwidth and latency*

* Mike Belshe, the impact of varying bandwidth vs. latency on the page load times

Crowdsourcing measurements data helps in simulating the user experience



How we measure the latency to services



Measurement Metrics:

- **Bandwidth Speed**
- **Social network**
- **Games**
- **Video conferences**
- **IXP**
- **Cloud providers**
- **CDN**
- **DNS**



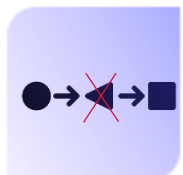
Speed: Data transfer rate between two parties (Mbps)



Ping/Latency: The time it takes for a packet to travel from one point to another (ms)



jitter: the extent of change in response time from one packet to another (ms).



Packet Loss: The number of packets that (did not arrive) were lost before they reached the other party

Improvement drivers

User Awareness



Reports / Workshops



Public Reports



Improvements on Routing



Fiber Latency

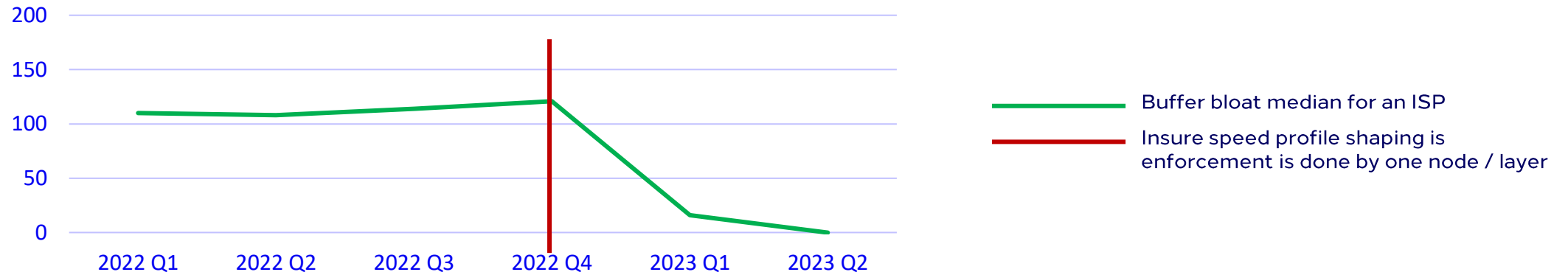
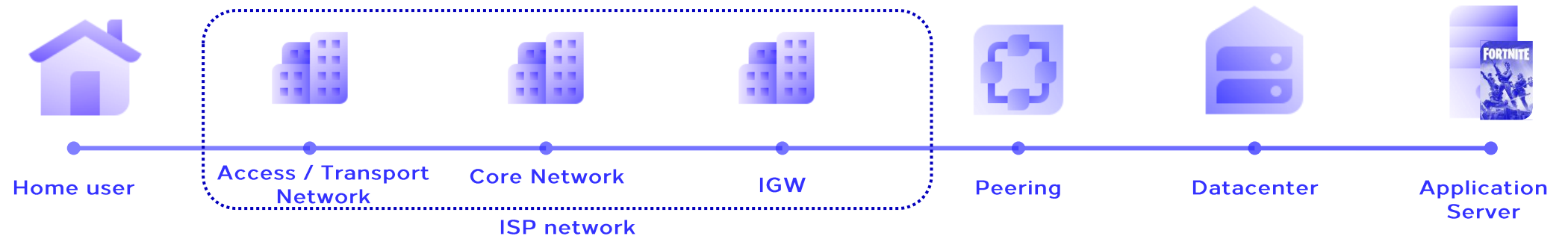
Publishing reports on the game Latency



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One more thing

Buffer bloat (Latency under load)



Latency under load or Buffer bloat is the impact on the response time (latency/ping) once there are multiple concurrent use of the Internet connection such as broadcasting video content, downloading and uploading files while using the Internet.



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Recommendations

- Crowd sourcing for higher coverage and actual user experience representation
- Measure to the real internet content and services (instead of measuring to the core)
- User different tools to measure different aspects of the internet QoE
- Track changes in dynamic content and adapt your tools.



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Thank you