Securing Ancillary Data for Communicating with Devices in the Network (SADCDN)

Matt Joras
Software Engineer & Ancillary Enthusiast

01

What’s your problem?

02

Existing Solution Landscape

03

Need For Standardization

04

Dispatch me?

01

What’s your problem?

02

Existing Solution Landscape

03

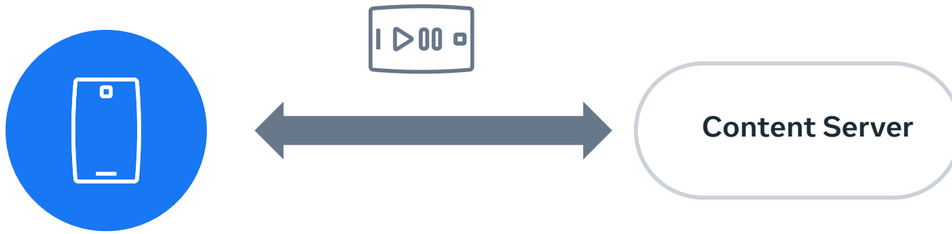
Need For Standardization

04

Dispatch me?

Adaptive Video Traffic Shaping

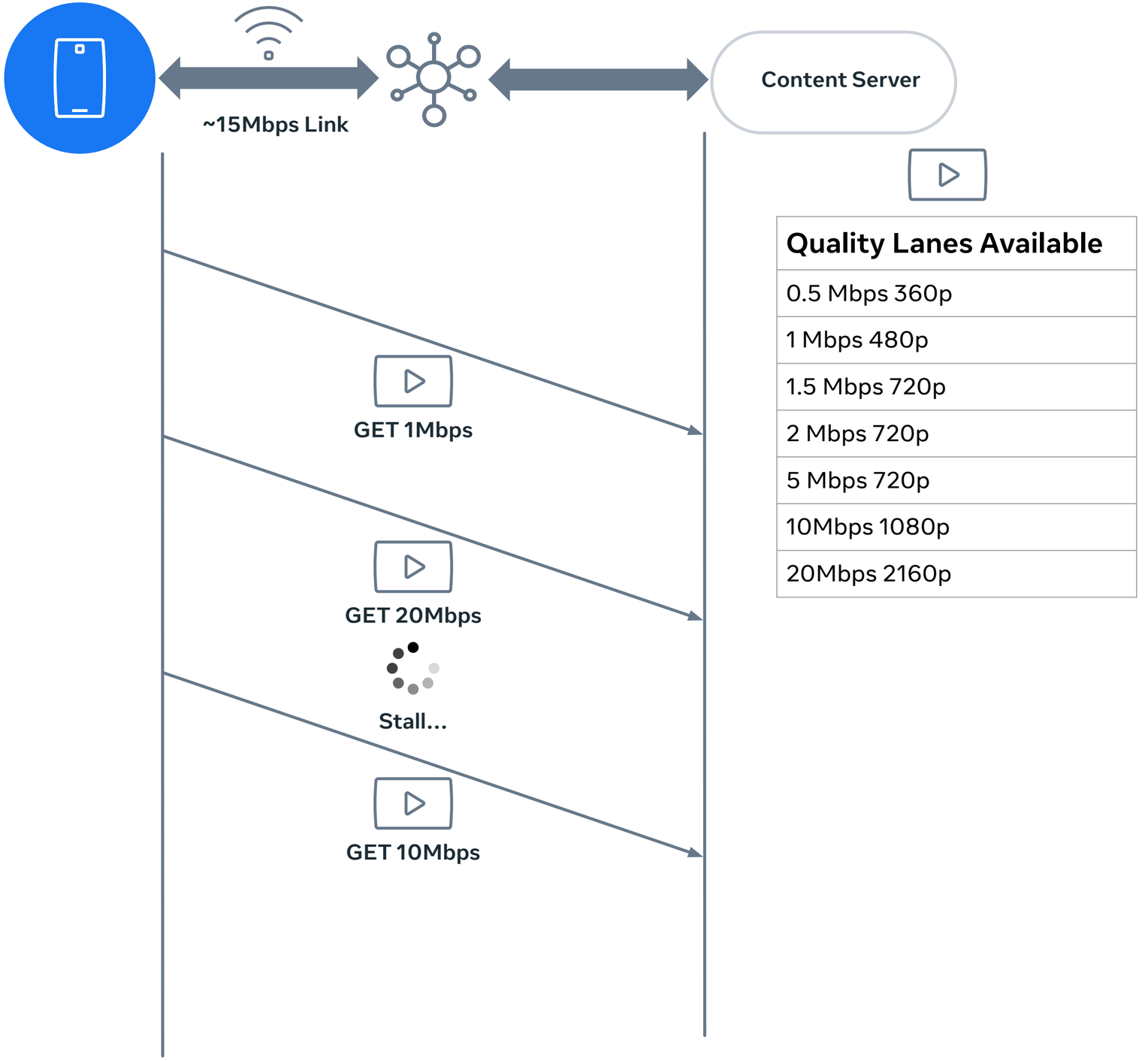
- Extremely common Mobile Network Operator (MNO) practice.
- Shaper typically implemented as Token Bucket Filter
- Configured so player adapts video to target bitrate (e.g. 2Mbps)



Adaptive Bitrate Video w/o Shaping

Modern ABR schemes can vary video quality requested per segment (e.g. HLS or DASH).

Adapts quality fetched to try to maximize bitrate without stalling based on measured bandwidth.



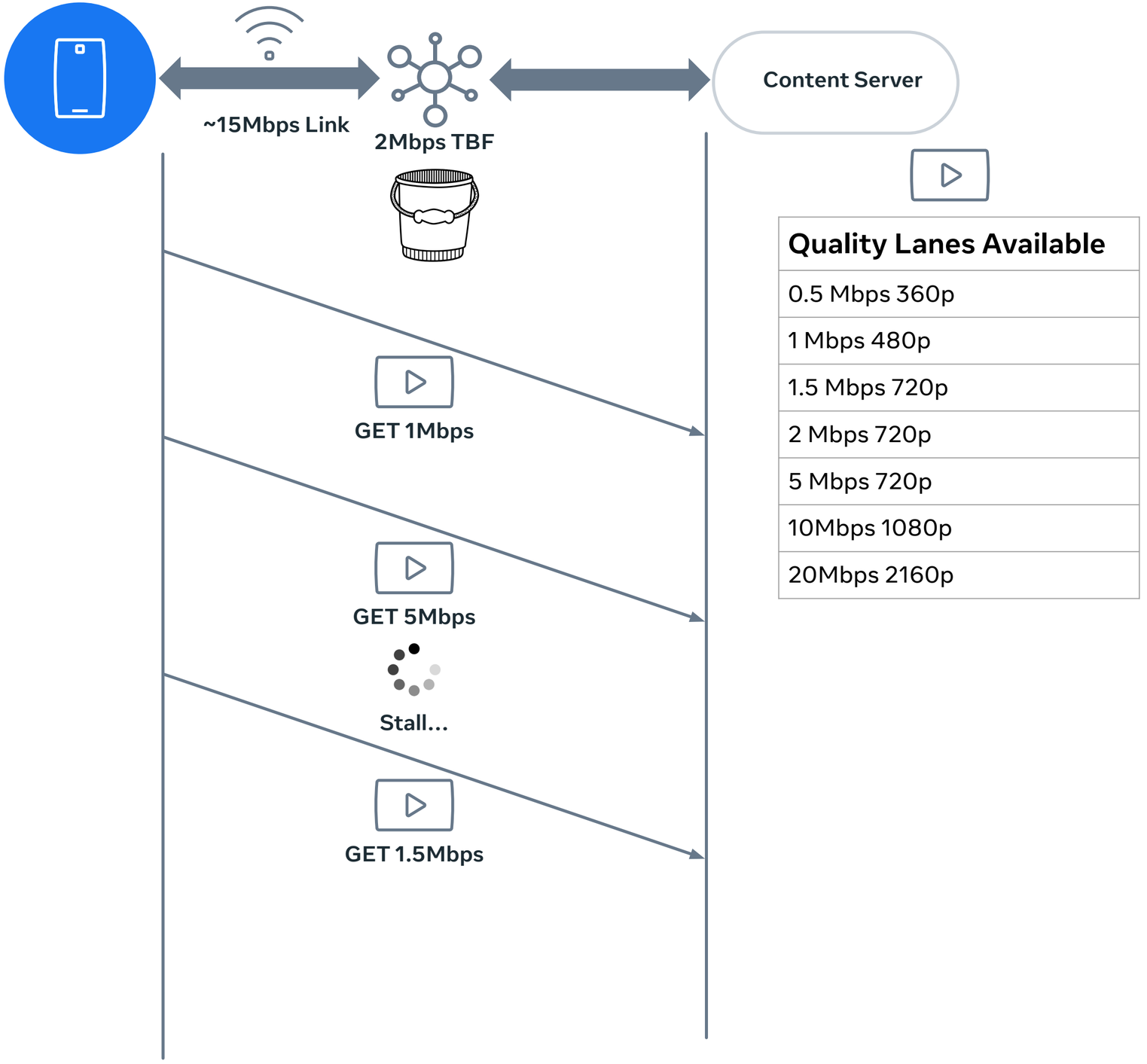
Quality Lanes Available
0.5 Mbps 360p
1 Mbps 480p
1.5 Mbps 720p
2 Mbps 720p
5 Mbps 720p
10Mbps 1080p
20Mbps 2160p

Adaptive Bitrate Video w/ Shaping

Video in particular can be expensive for MNOs and users.

Under congestion or to avoid plan overages, traffic shaping is applied.

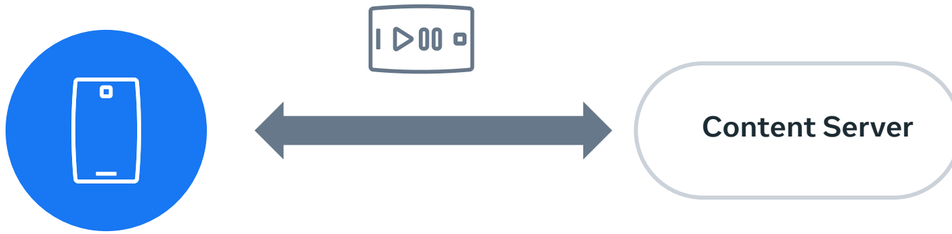
Desired outcome: ABR selects 2Mbps.



Quality Lanes Available
0.5 Mbps 360p
1 Mbps 480p
1.5 Mbps 720p
2 Mbps 720p
5 Mbps 720p
10Mbps 1080p
20Mbps 2160p

It works but...

- The limit imposed by the TBF is *artificial* – it can support instantaneously more bandwidth, leading to periods of underutilization and difficulty for radio equipment to optimize spectrum usage.
- ABR schemes are not perfect and don't converge quickly, causing poor user experience and stalling as it "ping pong" between qualities.
- Congestion Controllers are better suited to simple queueing and often make the "ping ponging" worse.



Adaptive Bitrate Video w/ Agreed Bitrate Cap

Video content provider and the operator agree to an instantaneous maximum quality.

The TBF is removed or “dialed back”.

Less stalling and better utilization of network resources.

Quality Lanes Available
0.5 Mbps 360p
1 Mbps 480p
1.5 Mbps 720p
2 Mbps 720p
~~5 Mbps 720p~~
~~10Mbps 1080p~~
~~20Mbps 2160p~~

01

What’s your problem?

02

Existing Solution Landscape

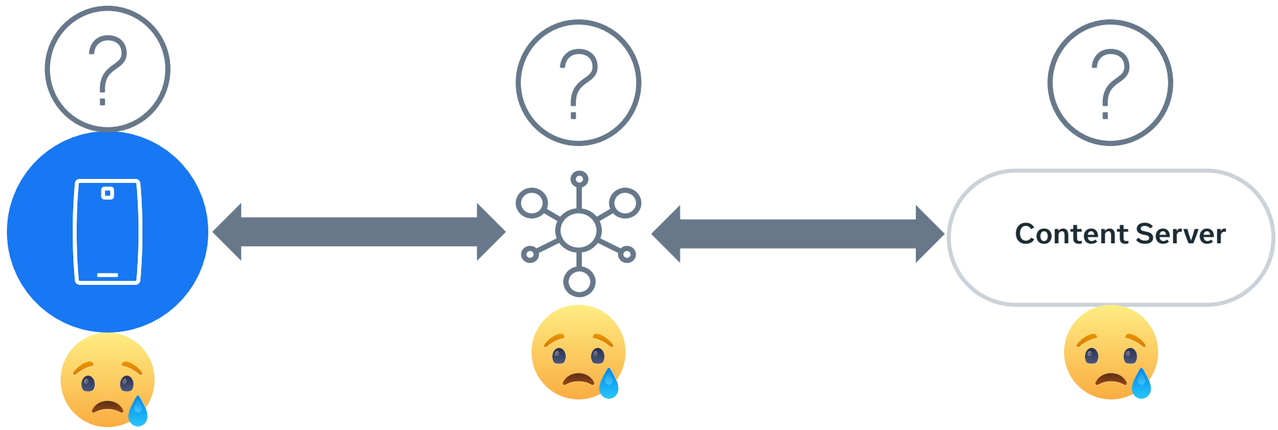
03

Need For Standardization

04

Dispatch me?

The fundamental problem is *information disparity* between network devices, content endpoints, and end users.



In-band Network Signals

ECN, DSCP, IP Options, TCP/UDP Options.

Out-of-band APIs

CAMARA, bespoke Mobile Network Operator integration APIs.

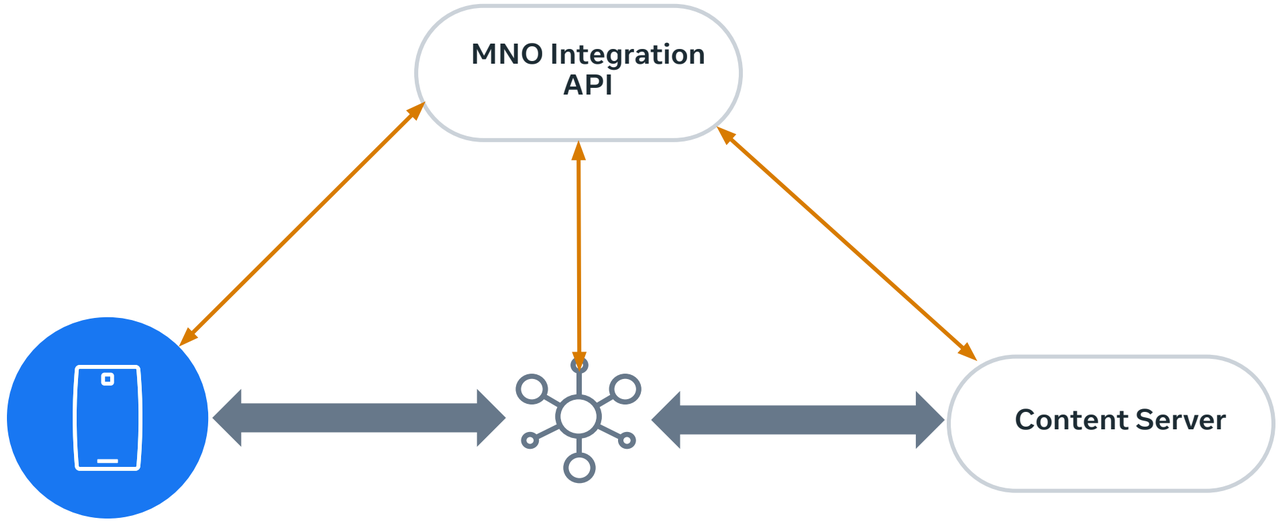
In-band Network Signals

- Limited information fidelity.
- Visible on the wire.

Out-of-band APIs

- Very high integration complexity.
- Requires additional operations from every MNO.
- Impossible to convey realtime information.

Out-of-band solutions do not scale and have high complexity for MNOs, OEMs, and Content Providers.



01

What’s your problem?

02

Existing Solution Landscape

03

Need For Standardization

04

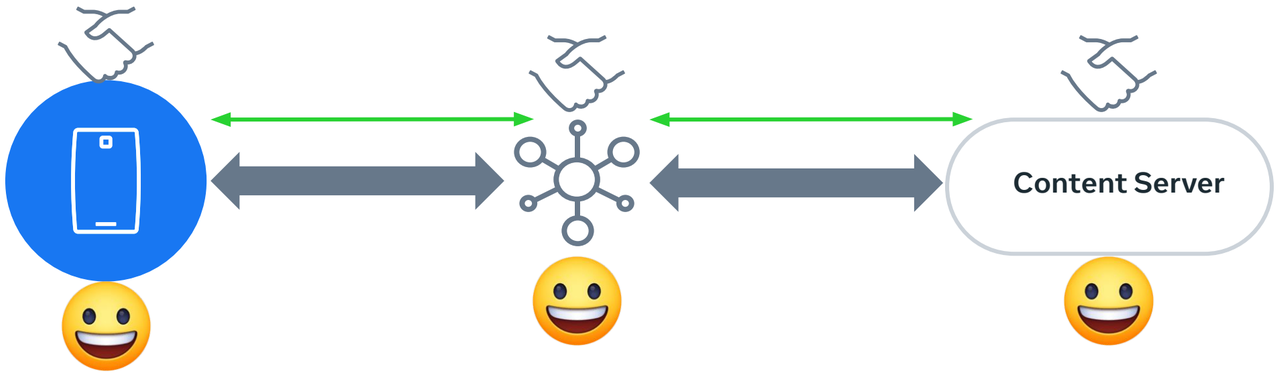
Dispatch me?

Secure with standard cryptography

In-band session establishment

Information exchange w/ user transparency

Open interoperable standard



01

What’s your problem?

02

Existing Solution Landscape

03

Need For Standardization

04

Dispatch me?

What now?

- Is the IETF the right venue for this work?
- Are others facing similar problems?
- Are there others interested in this work?
- How can we learn from past similar efforts?
- **Side Meeting Tue 18:00**
  - OEM and content endpoint perspectives.