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2016 BEST PRACTICES AWARD

GLOBAL RADIO ACCESS NETWORKS CAPACITY TRAFFIC SHAPING PRODUCT LINE STRATEGY LEADERSHIP AWARD

# Dealing with Congestion
# Optimal QoE
# Best-in-Class Video Delivery


**John Reister**
**VP Marketing & Product**


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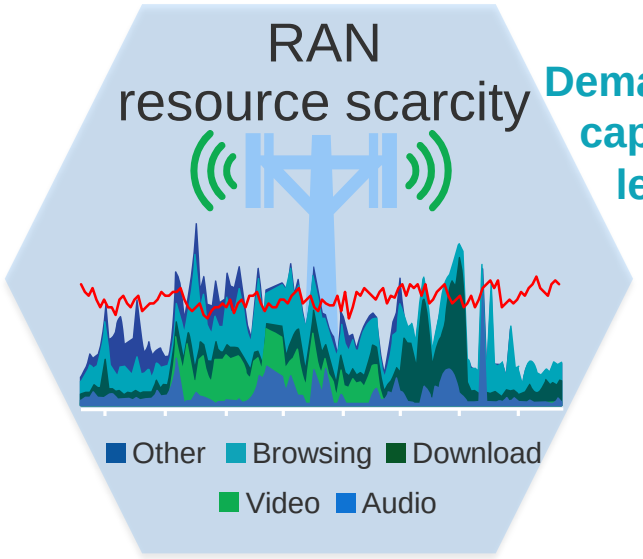
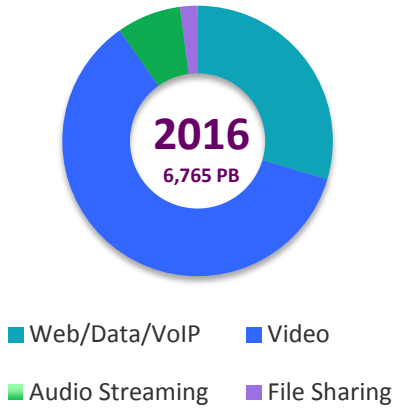
vasona networks

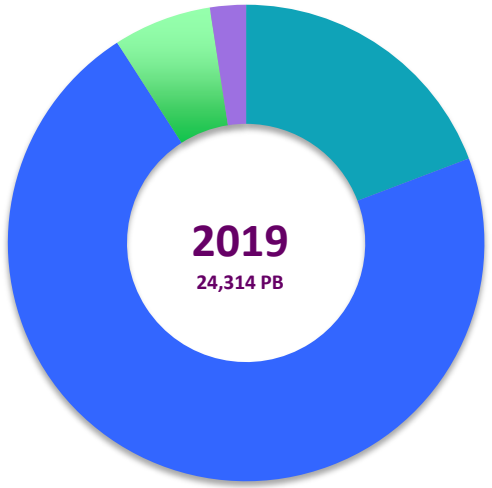
# Mobile Industry Challenges …




**Demand spikes and capacity fluctuation lead to poor QoE and underutilization**

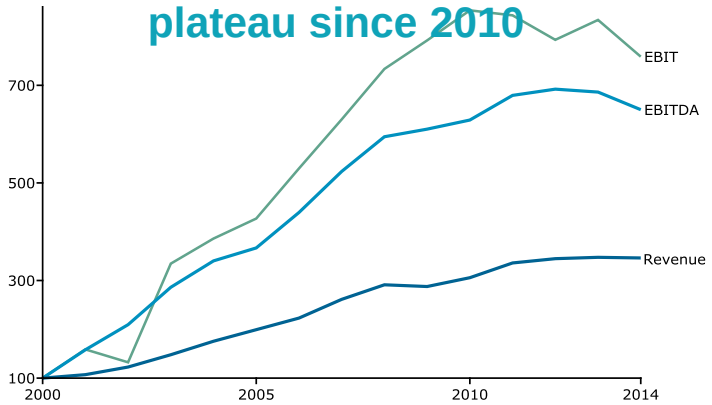
**Global Mobile monthly data usage**




**Crushing growth driven by video**

**Increased competition coupled with massive traffic growth causes profit plateau since 2010**



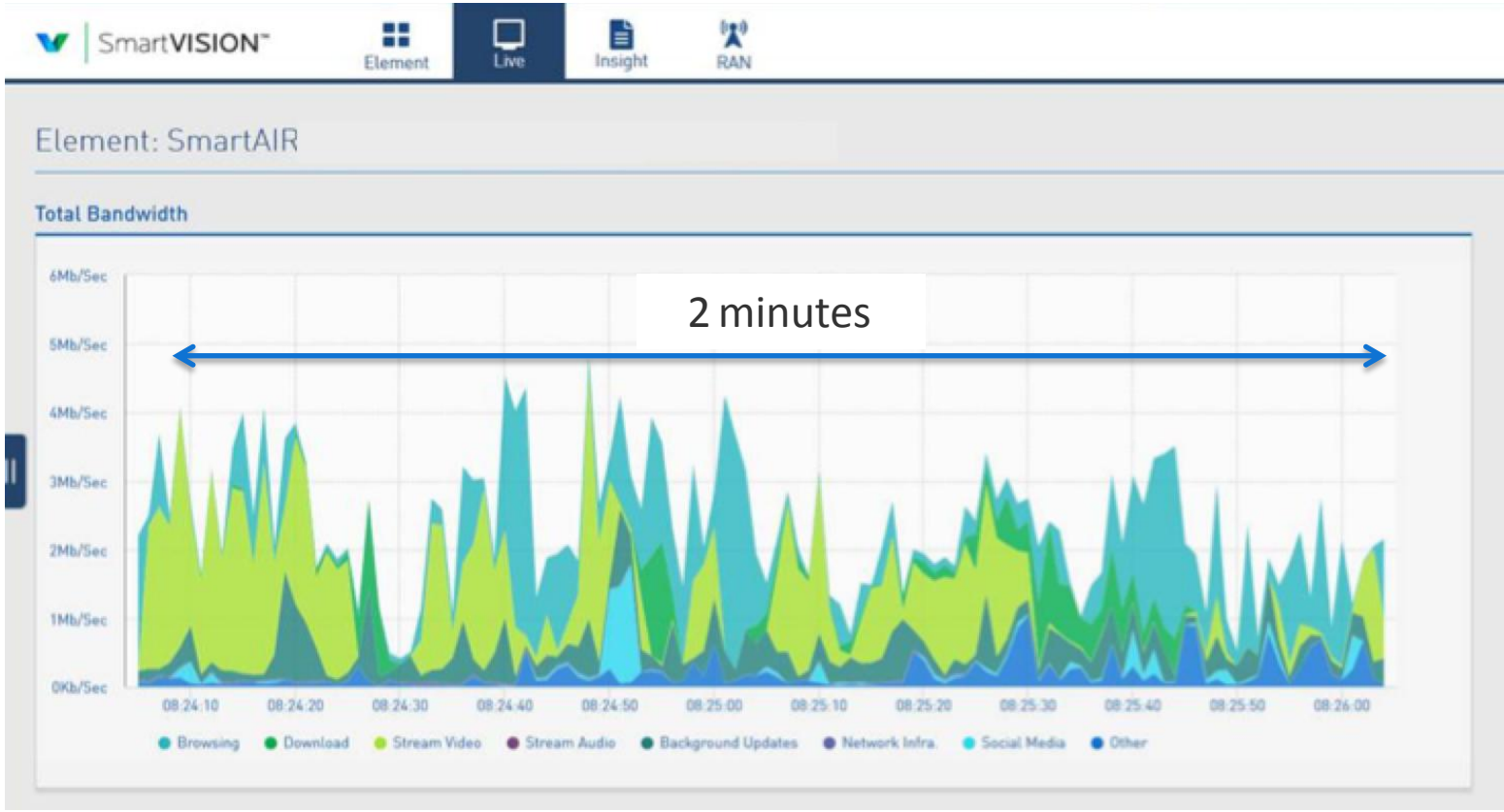

- Telecom is conduit to $5.3T ecosystem worldwide
- On average, people check their phones 150 times per day - 2.7 hrs

…with major opportunity

Sources: LTE traffic from field trial. EBIT from GSMA. Traffic from Cisco Mobile VNI 2015

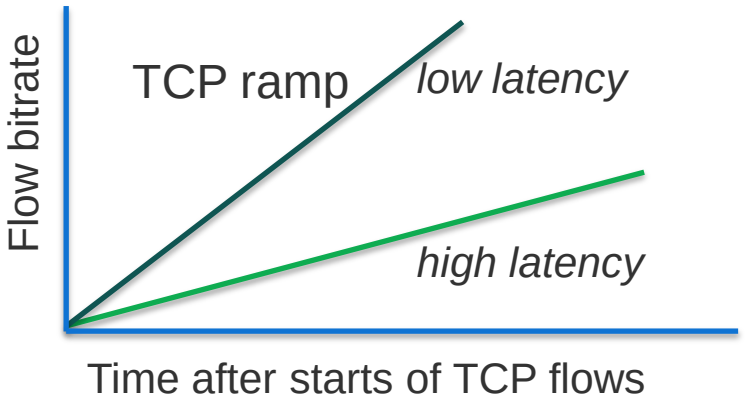
# Nature Of Actual Congestion:
# Speed of Congestion Onset Requires a Rapid response

- Actual demand placed on a single 3G cell sector
  - [India, 8:24am May 2016]
- Demand spikes last from 0.5-5 seconds
  - RAN queues back up
  - *Latency* jumps
  - Packets dropped indiscriminately
- Interacts with capacity fluctuation
- *Reduces QoE and Network Efficiency*



# Demand Spikes, Capacity Fluctuation → Underutilization, Abandonment

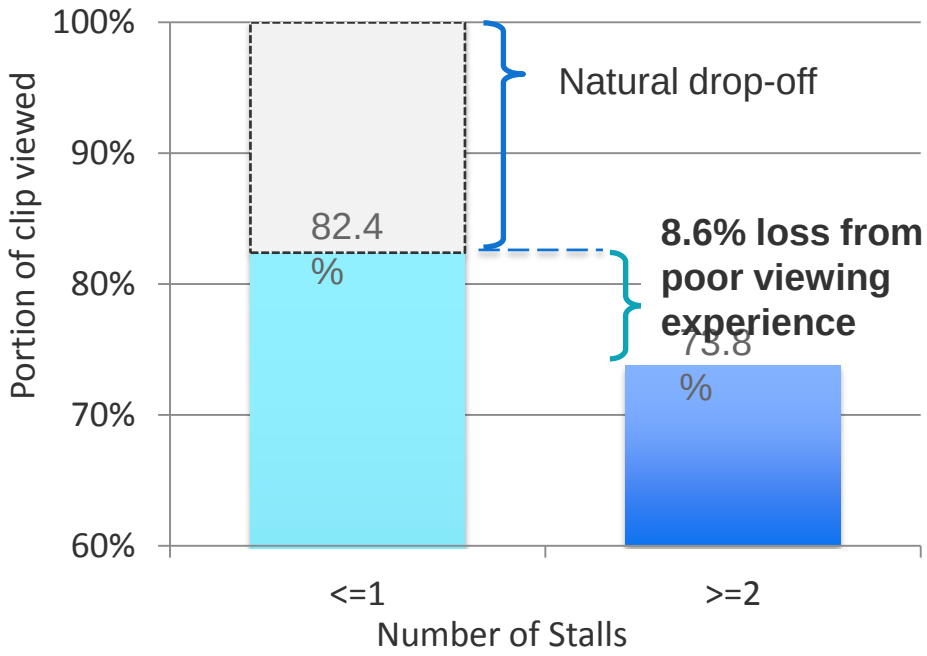
## Latency slows flow acceleration, bringing on **underutilization**




amazon 100ms = 1% Less revenue
Slower page load

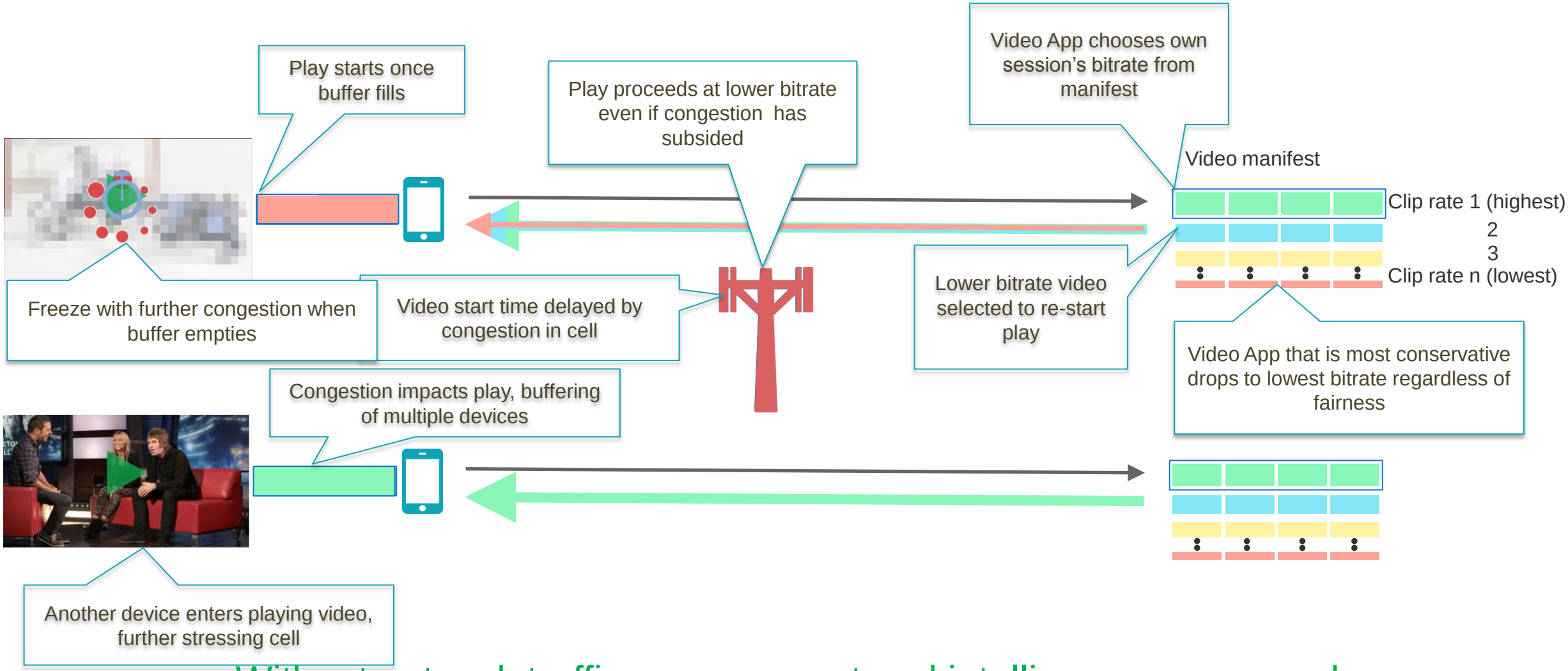
YAHOO! 400ms = 9% Less traffic
Slower page load

## Variable latency stalls video, causing **abandoned** sessions



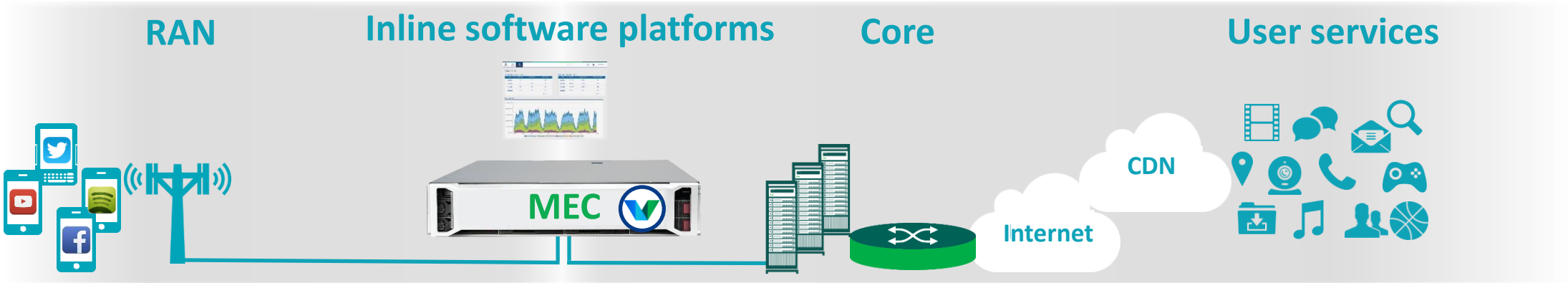

source: Vasona field deployment, evaluation of 40,000 video sessions

# Challenge: Equitable Adaptive Bitrate Self Governing By OTT, Branded Video

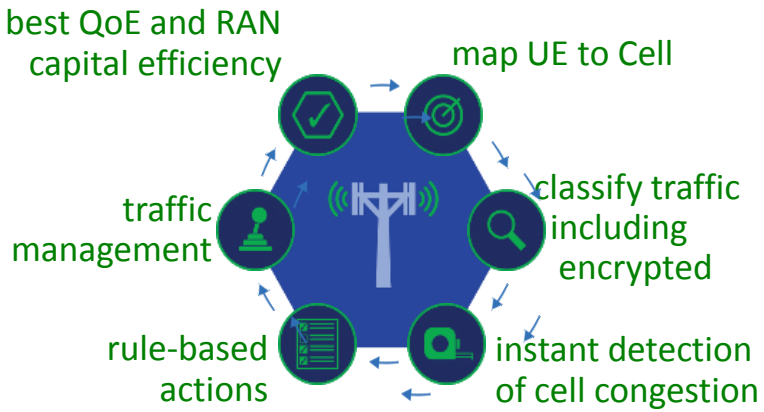



Without network traffic management and intelligence, apps produce experiences that can be inconsistent, unfair, and poor quality

# NFV Or Appliance Hosted Mobile Edge Computing (MEC) For Best Efficiency




## Mobile traffic management handles contention




## Mobile Packet Assurance resolves packet loss

**Quick recovery from packet loss means responsive service for live apps:**


## Guidance to sustainable rate for best-in-class video

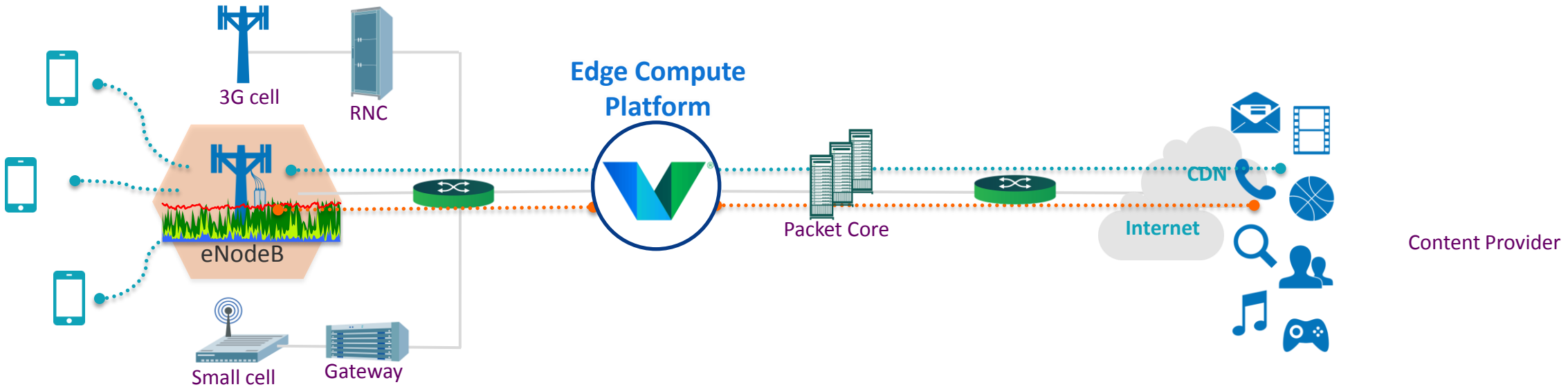
Pristine resolution, poor play

Good resolution, good play

Poor resolution, good play

Good resolution, good play

# Big Picture Of Achieving Best-In-Class Delivery Of Encrypted ABR Video




Dynamic Traffic Management

*Handles contention*

TCP Acceleration (Mobile Packet Assurance)

*Fast Recovery from RAN packet loss*

Guided Video Rate (GVR)

*Throughput Guidance at best sustainable rate*

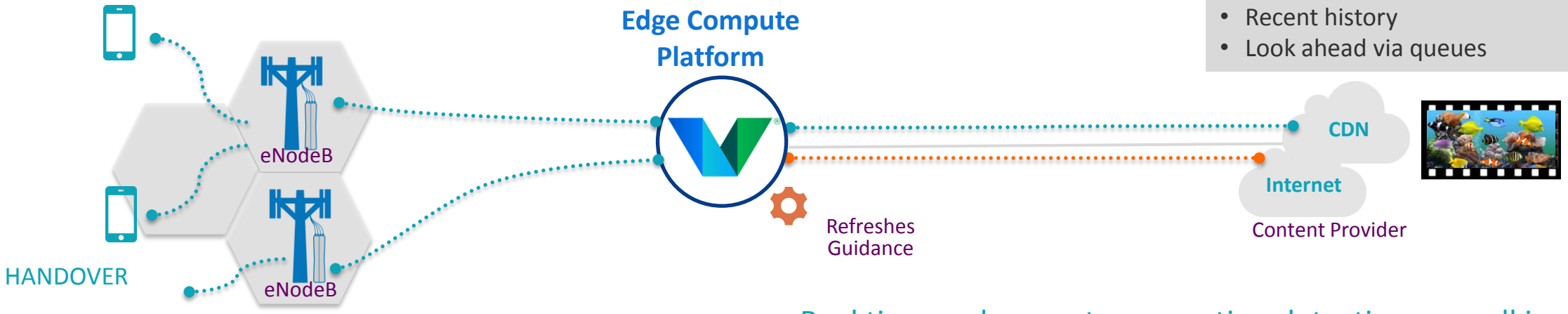
Management & Analytics

*Insights for planning and customer management*

# Guided Video Rate (GVR) In-Band Management For HTTPS ABR Video

**GVR best sustainable rate**

- Looks at all flows in the cell
- Real-time cell capacity
- Individual UE capacity
- Recent history
- Look ahead via queues




**Improved Video KPIs**

- Reduce video start delay
- Reduce number of stalls & total stall time
- Reduce the number of video format changes
- Improve the video watch time

**Preliminary Field Results on Commercial Network**

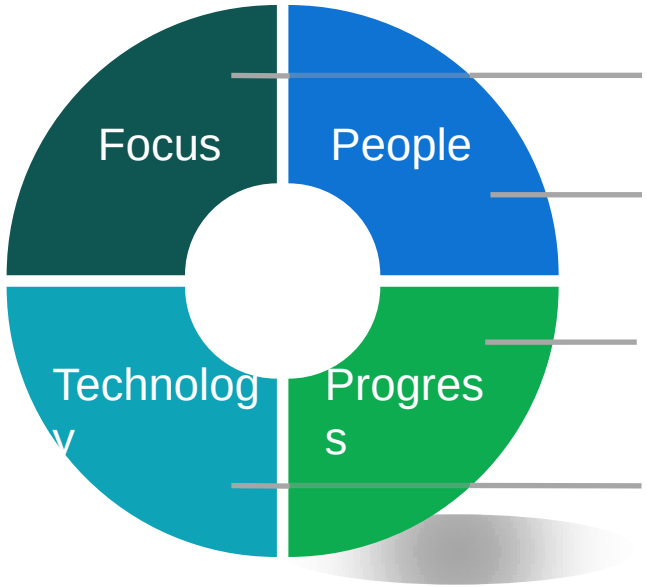
- 100,000 video sessions
- 20% reduction in stalls

- Real time and accurate congestion detection per cell in milliseconds
- Tracks all handovers including inter and intra (e)NodeB
- Enables business partnership between MNO and OTT Content

## Guided Video Rate (GVR)

In-band video management for HTTPS ABR Video

# Vasona: Cell Performance Specialist




SW platforms for service delivery over mobile networks

Silicon Valley HQ, presence on 4 continents
Experts from mobile, media, networking spaces

3G & LTE deployments by global top 20 MNOs in EMEA, APAC, Americas
Millions of subs live

Real-time session management on cell-by-cell basis
37 patent filings;9 granted

**Investors** BESSEMER VENTURE PARTNERS · NewVenture Partners LLC · vodafone™ · **$48MM raised**

**Awards** Frost & Sullivan 2016 Best Practices Award · Fierce 15 Winner · CTIA Emerging Technology Awards 2013 · 10 Leading Lights 10th Anniversary · telecoms.com LTE Awards 2014 · AlwaysOn To Watch Winner · TiE 50 2014 Winner · CTIA Startup Lab Finalist

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# Thank you

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