LTE as a Video & TV Distribution Network

THE MOBILE VIDEO ECOSYSTEM

Bob Sleigh

UKNOF27 Manchester

21st Jan 2014

Mobile Network Capabilities

Typical | **Peak**

speeds

Min Speed?
30-50 Mbps
16-24 Mbps
8-12 Mbps
4-6 Mbps
0.7 Mbps
240 kbps
100 kbps
50 kbps

300 (Cat6) -> 1000 Mbps
100- 150 Mbps (Cat 3/4)
73 Mbps
21 Mbps
1.8 Mbps
340 kbps
250 kbps
100 kbps








4K Video &
Multi-task

Gaming / Cloud
Video Conf

HD Video Streaming

Apps, Downloading
Video Streaming

Music, Web browsing

MMS

Email

Voice, Text

Rich Messaging &
Communication

Interactivity

2.5G/Edge | 3G | HSPA | HSPA+ | 4G/LTE | 4G+/LTE-A

Data Capacity

LTE - UK is becoming a global leader

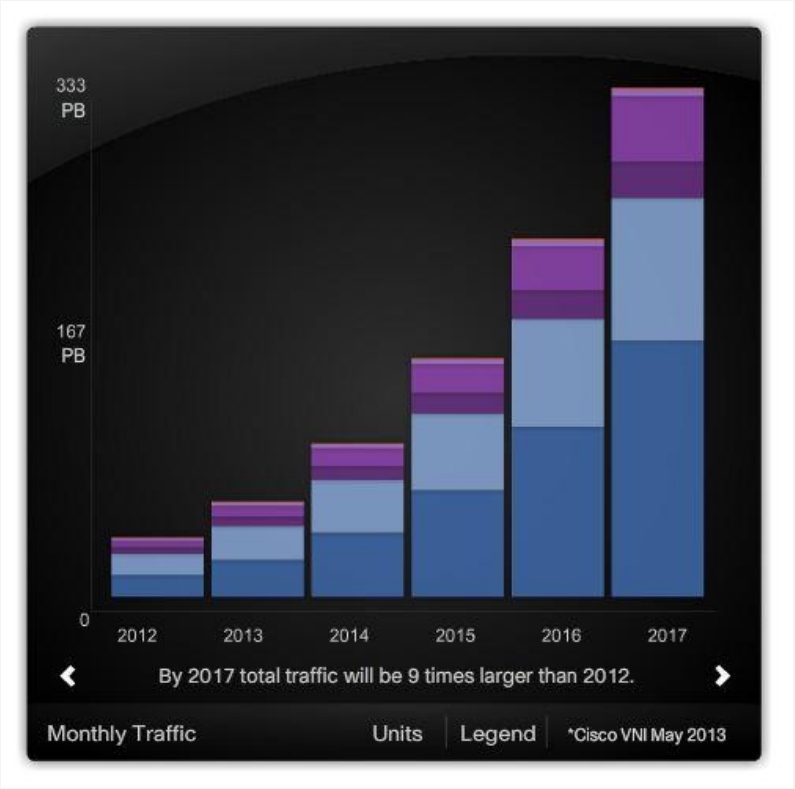
LTE

October 2012	First LTE live in UK
December 2013	over two-thirds of population coverage
...	
December 2014?	98% population coverage

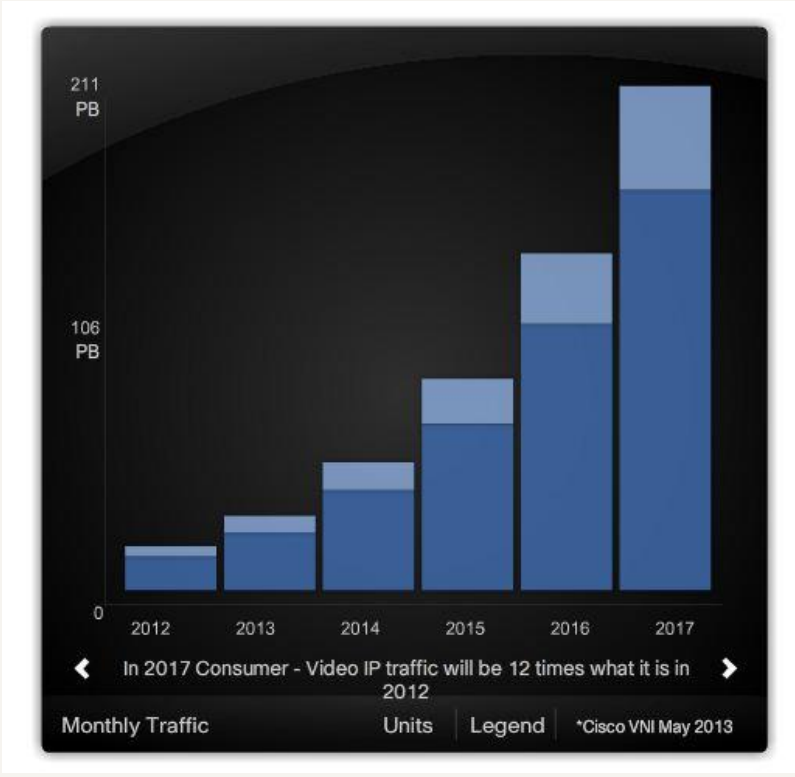
LTE-A

November 2013	Techcity LTE-A 300Mb Trial
During 2014	First commercial LTE-A live in UK

Forecast Mobile Data & Video Demand for UK



Mobile Data



Mobile Video

What does 'Good' look like?

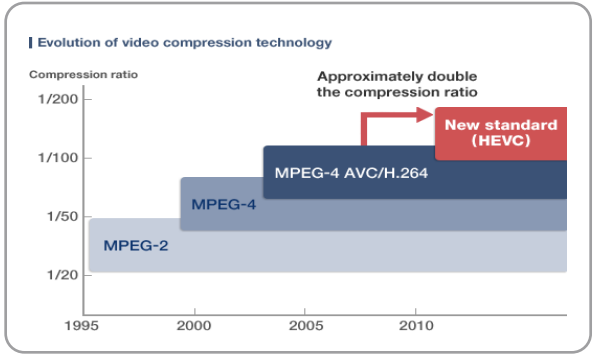
How do you benchmark QoE?

- Short form or long form
- Live, catch up or VOD
- Purchased or free
- Device type
- Buffering or adaptive streaming
- Amount of buffering or lower bit rate
- Where in the video this occurs
- Original quality of the video (SD, HD etc)

Video Codec Evolution

How the evolution in video codec's can reduce bandwidth

- Reduced bit rate and file size but similar resolution
- Reduces network traffic
- Improved User Experience with lower bandwidth



• High Efficiency Video Coding (HEVC) has nearly halved the bit rate and file size of the previous HD standard – Advanced Video Coding (AVC)

• Combining the latest compression technology with Adaptive Bit Rate (ABR) technology could provide a reduction in traffic whilst maintaining a higher QoE

• HEVC is one of the key elements in the move towards Ultra High Definition TV (UHDTV) which is likely to push the bit rate back up to AVC levels

HEVC (H.265) Video
PSNR – 39.72dB
Bit Rate 610kbps
File Size 3.10MB

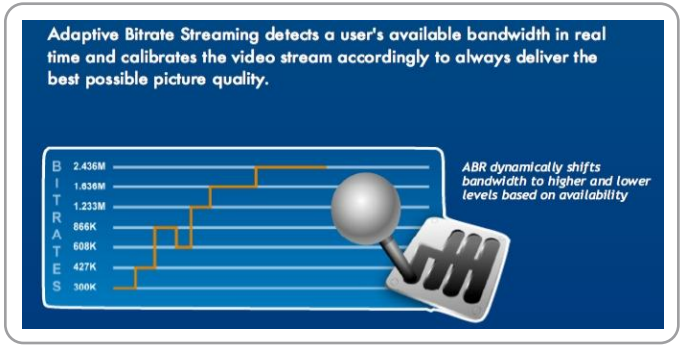
AVC (H.264) Video
PSNR – 39.65dB
Bit Rate 1183kbps
File Size 6.01MB

Adaptive Bit Rate Technologies

Using Adaptive Bit Rate (ABR) to manage video traffic

- **Historically, mobile video streamed at a fixed bitrate**
- Buffering and loss when connection speed too low
- Users preferred lower resolution over buffering
  - User could sometimes select video resolution
- **ABR tailors stream to the device and available bandwidth**
- Connection speed changes, bitrate adapts in real time
  - Reduces buffering
  - Better user experience in congestion and at cell edge
  - Minimises user interaction

- **Left unmanaged, ABR can lead to unpredictable data usage**
  - Content streams at the highest bit rate available
  - HD uses significantly more data than SD



Standardisation - DASH

Standardising ABR with Dynamic Adaptive Streaming over HTTP

- Multimedia file partitioned into segments
- MPD file describes segment information
  - timing, URL, media characteristics eg video resolution, bit rates
- Delivered to client using HTTP
- **DASH is audio/video codec agnostic**
- Segments can contain any media data
- But spec provides specific guidance and formats
  - MPEG-4 file format
  - MPEG-2 Transport Stream
- Multiple representations (different resolutions, bit rates)
- Selection can be made based on
  - Network conditions, device capabilities, user preferences

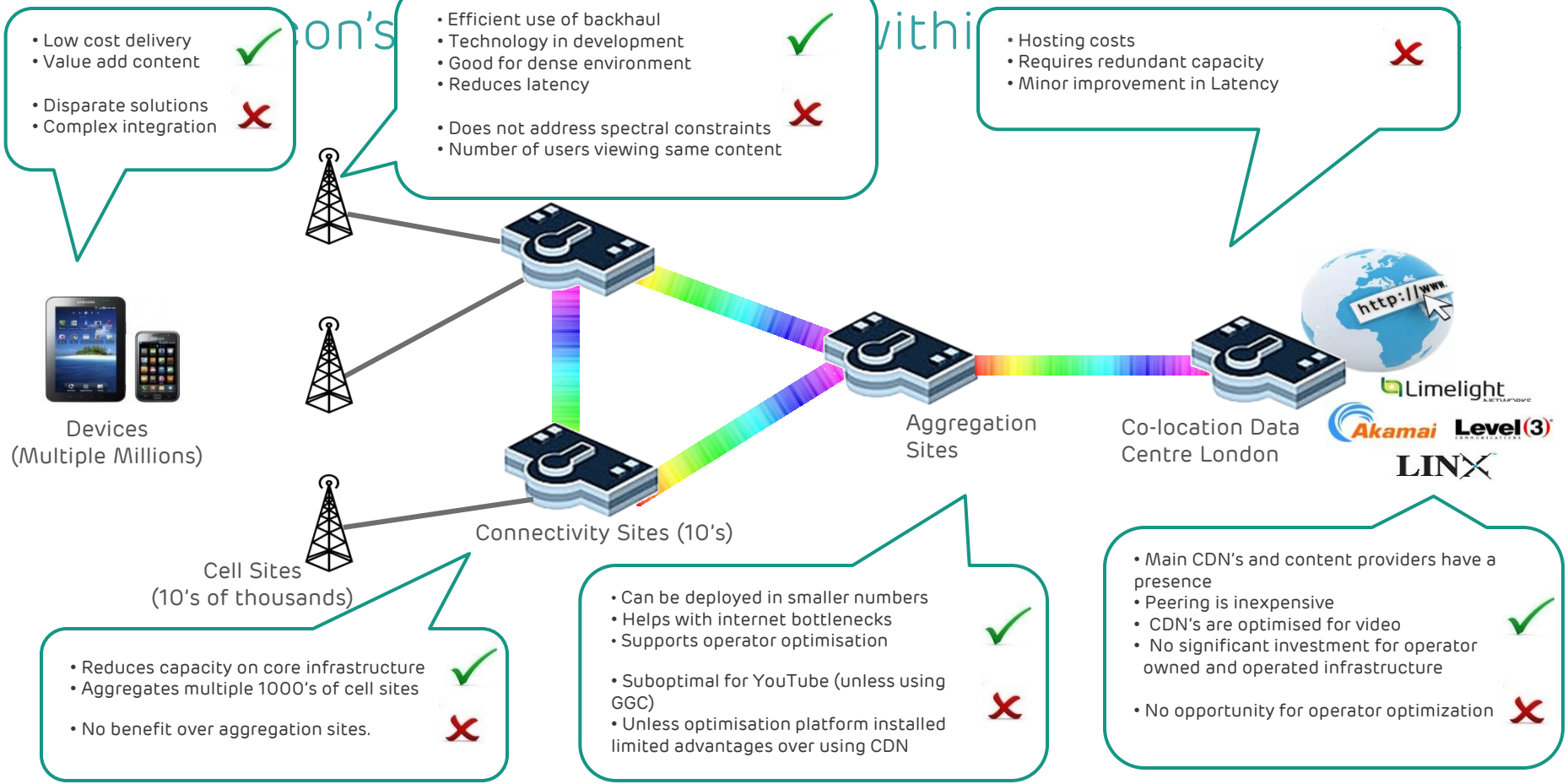
DASH Industry Forum

mpeg-DASH

Multimedia broadcast technology

An example of live sport driving data usage

Caching mobile video



Multimedia broadcast technology

How reduce video traffic using broadcast technology

- BBC & Sky predict rise in linear TV over the mobile networks
- MNOs reviewing commercial/technical viability of broadcast technologies
- The current technological standard for LTE is eMBMS

- **evolved Multimedia Broadcast Multicast Service**

- Huawei - technology centre in Shenzhen for development of eMBMS
- Qualcomm - demonstrated eMBMS with E/// at MWC2012
- Verizon - may do Superbowl 2014 over eMBMS

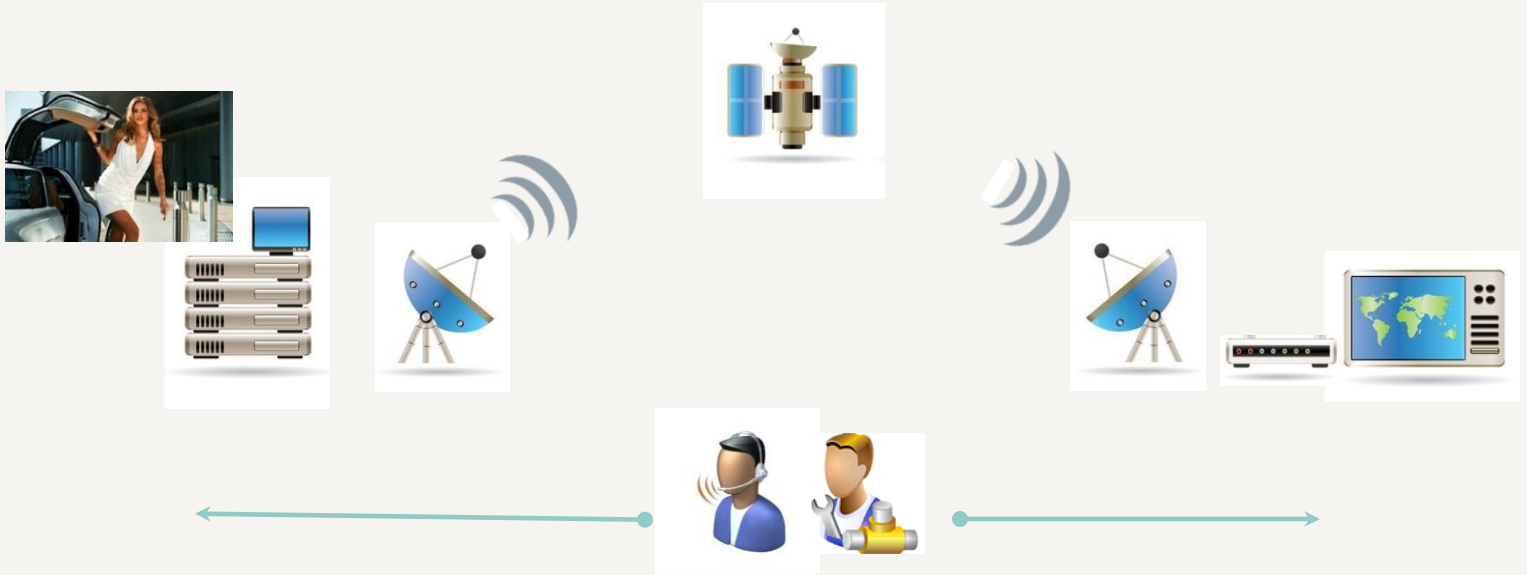
Efficient use of LTE spectrum & network investments

Broadcast most popular content in the geographical areas it makes sense.

Enable the possibility to offer services over dense areas as arenas etc.

Video distribution - Satellite

Comparing mobile video delivery with traditional methods



- Alignment of technical roadmaps
- Control of QoE
- Ability to be able to perform end to end testing

Video distribution - Mobile

Comparing mobile video delivery with traditional methods

?????

Current and future technologies

Analysis of current and future Mobile Video technology

There is currently a technology disjoint in the end to end mobile video chain. Without increased communication and knowledge share between the parties technology advances cannot be fully exploited

- Content caching
  - Device
  - Core
  - Edge
- Video codec evolution
- Adaptive Bit Rate
- Multimedia broadcast technology
- Video optimisation platforms
- Content Delivery Networks
  - Self build
  - Pure play
  - Federations

There is no 'Silver Bullet' as an operator we will need to a have a constantly evolving 'tool kit' of technologies

Where now?

2014 – When mobile video becomes an ecosystem

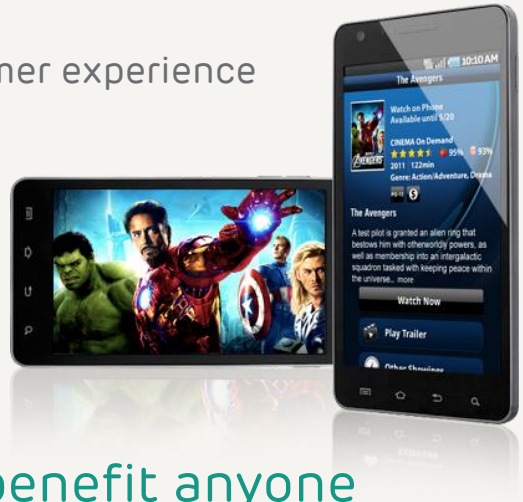
Industry discussion and knowledge share is key to a successful mobile video industry

Ensuring Users QoE is not impacted by the 'Mobile Video Tsunami' can no longer be seen as something for operators to sort out alone

Any party working in isolation may negatively impact the customer experience and cost to serve

An end to end understanding of mobile video technologies will lead to greater innovation from all parties

Use the combined weight of the whole industry to back mutually beneficial technology e.g. MPEG-DASH



Globally congested mobile networks do not benefit anyone

Thank you