

Transport for London

Adrian Streeter

Feb 2012



..some background:

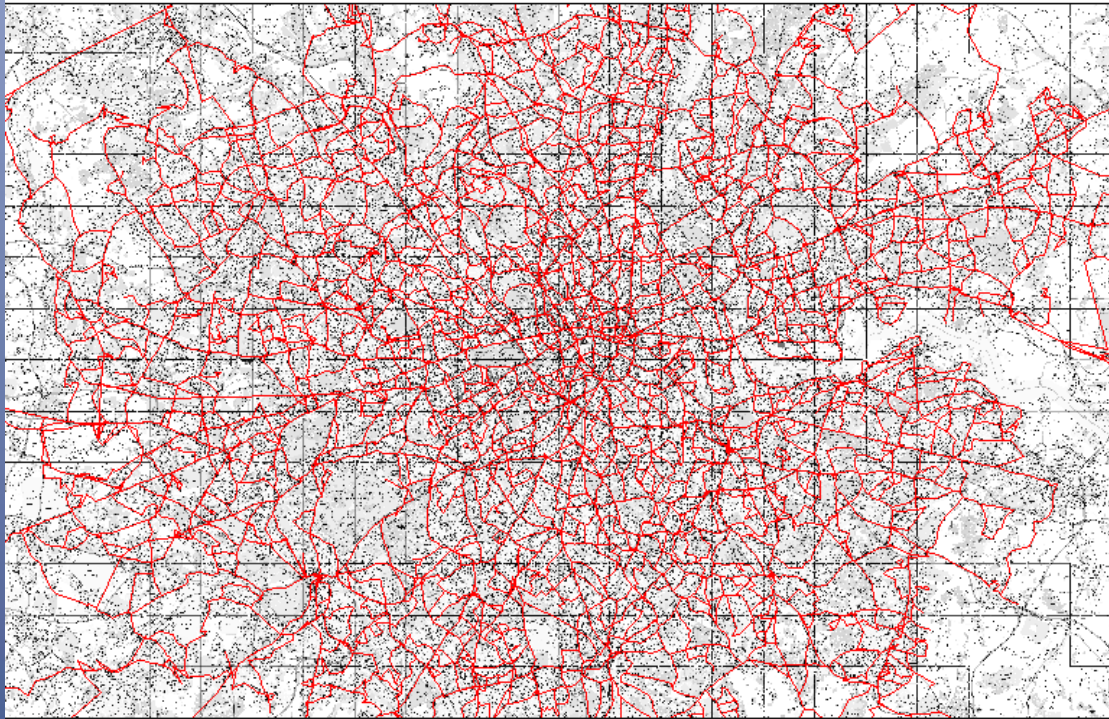
TfL has three main radio systems:

- London Buses – iBus (MPT1327) system
- London Underground – Connect (TETRA) system
 - TfL wide – Airwave Direct service

Why three?

- Systems have evolved independently due to investment cycles
- Spectrum and vendor equipment has driven many decisions

London Bus System



700 routes, 19,500 bus stops

7,600 buses (peak) , 6.5 million passenger journeys/day

2.3 billion passenger journeys / yr

iBus Radio

- 10 base stations cover greater London (inside M25)
- MPT1327 on 66 traffic channels
- Resilient at node, back haul and coverage levels
- >5hrs backup time at base stations
- Spectrum allocation approx 148MHz and 139MHz (BS Rx and BS Tx)
- Busy hour, busiest site >750 calls / hr*
- >35,000 calls / day*
- Approx 230 'code red' calls /day

* Normal week day, more during events.



London Underground and Connect

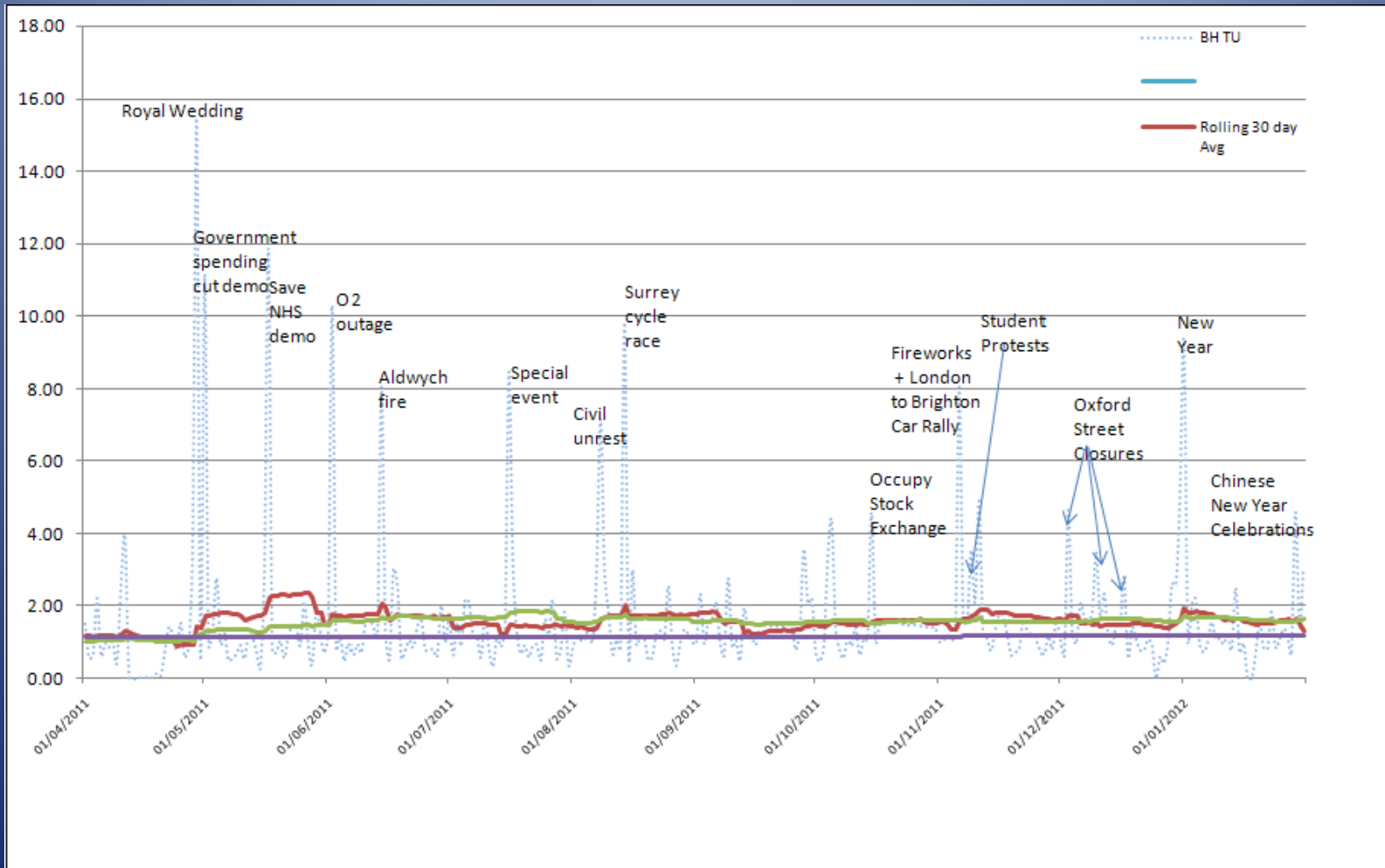
- 3.2 million passenger journeys /day
- >1.1 billion passenger journeys /yr
- Connect is LU's private digital (TETRA) network
- rolled out in 2006 partly in response to July 7th 2005 bombings
- Integrated with Airwave for 'blue light'
- 291 base stations, 409 dispatcher terminals, 9,800 hand portables
- Typical daily call profile:
 - Group = 18,700, Point to Point = 4,440, PSTN = 1,500

Airwave Direct at TfL

- 235 hand portables and 7 dispatcher terminals across TfL
- Strict 'public safety' TEA2 licence
- 'Blue light' interoperability. Close working with Met Police
- Operates on LU (common radio elements with Connect)
- Pre planned events, non planned incidents
- TfL command and control enabler for major incidents
- Eliminate reliance on public mobile networks



Airwave Direct at TfL



Data (London Buses)

GPRS for iBus:

- bus location info approx 15K messages / min (peak period)

3G for Countdown signs:

- 2,500 bus shelter signs >50Mbytes /hr

Countdown real time bus arrival:

- SMS: 19.7 thousand requests / day
- fixed web: 961 thousand hits / day
- mobile web: 1,059 thousand hits / day





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London Buses

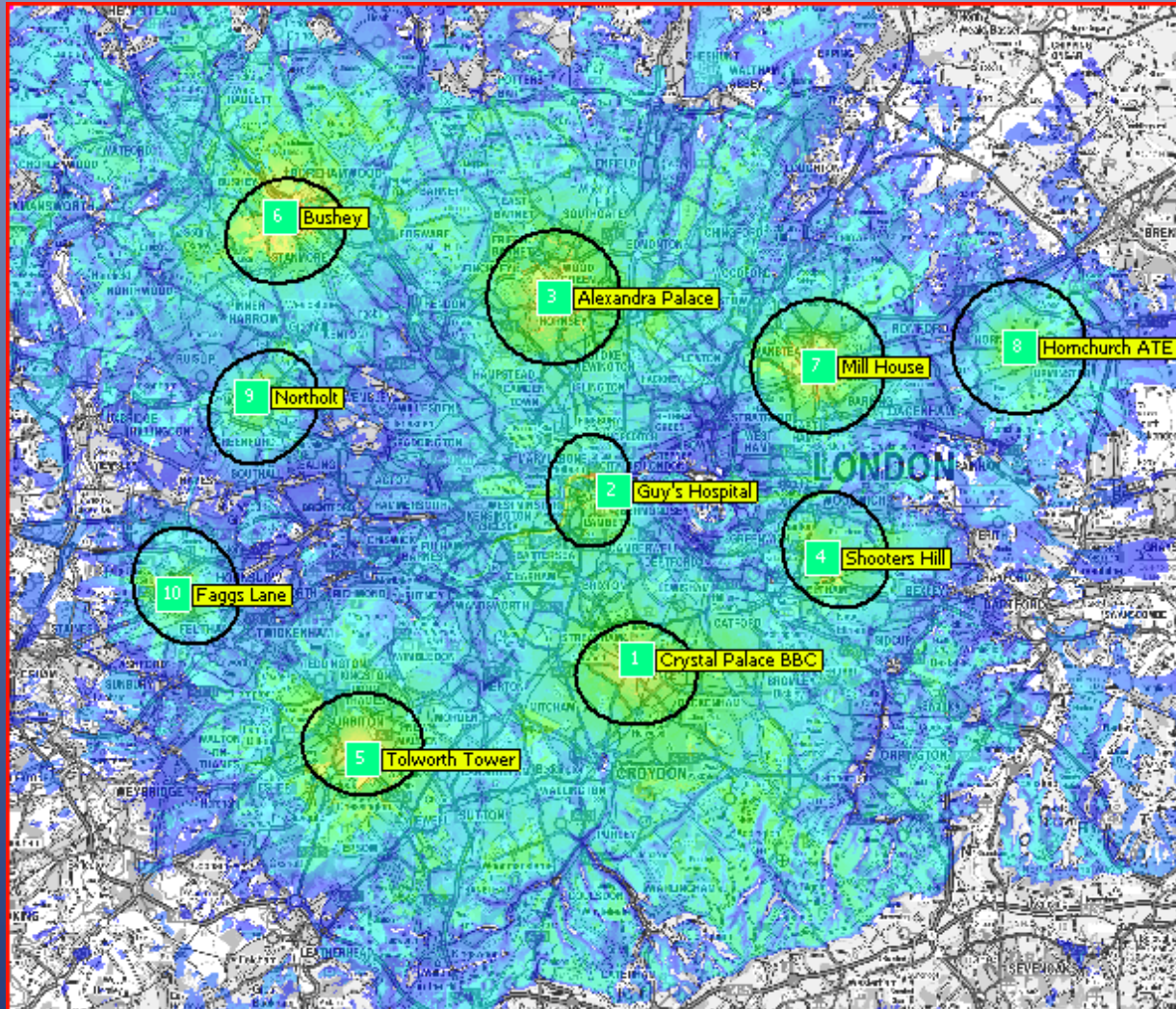
adrian.streeter@tfl.gov.uk

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Global mobile data traffic will grow 18 times between 2011 and 2016, to 10.8 billion gigabytes per month, according to the latest report from Cisco's Visual Networking Index Global Mobile Data Traffic Forecast. Additionally, by 2016 video is expected to make up 71 percent of all mobile data traffic, up from the 66 percent by 2015 that Cisco forecasted last year. By 2016 there will be more than 10 billion mobile Internet connections around the world, according to Cisco, with 8 billion of them being personal devices and 2 billion machine-to-machine connection.

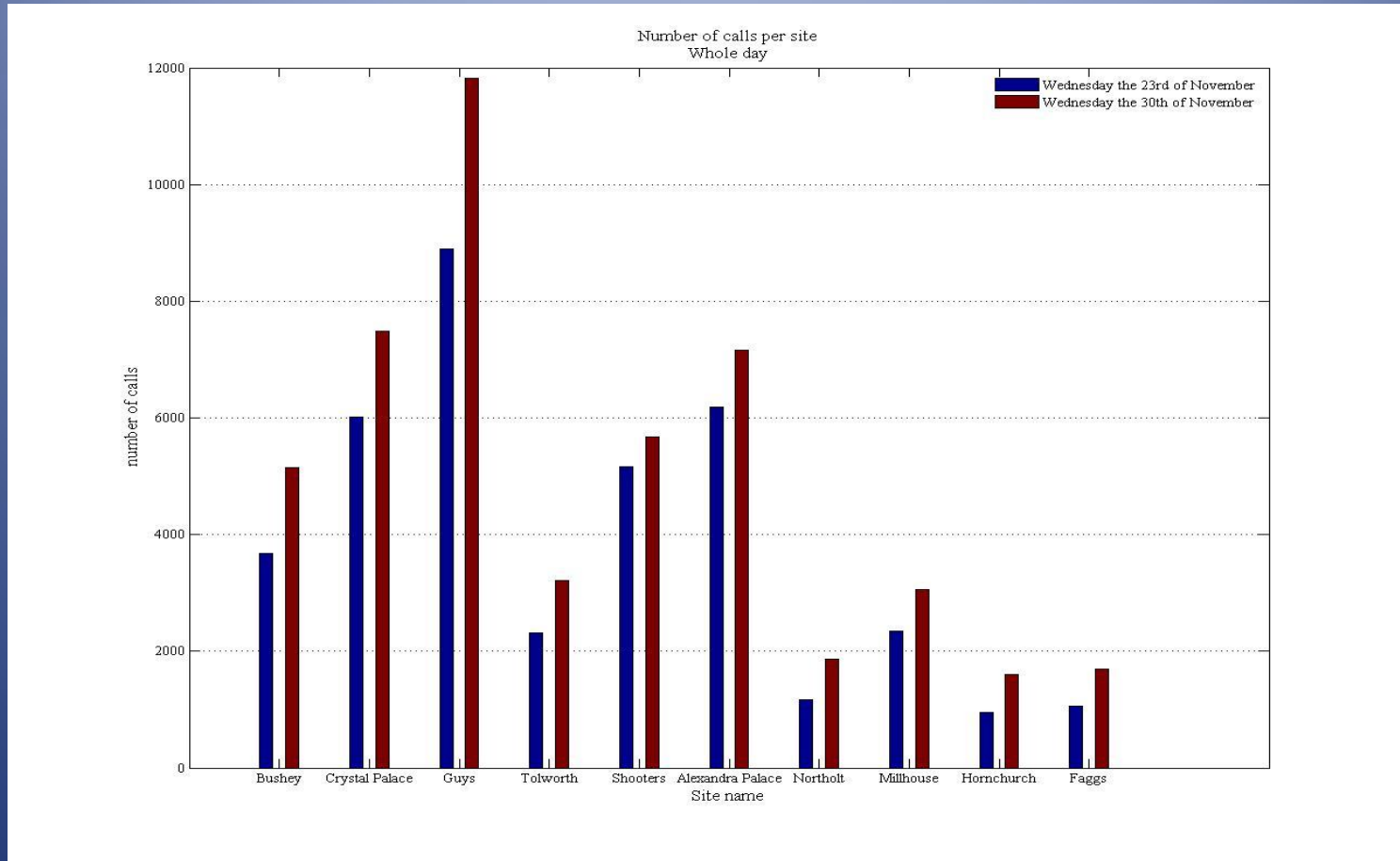
Cisco's annual report is widely cited every year by carriers and vendors alike as a key benchmark for measuring and predicting data traffic, and also as a data point to justify calls for network investment, traffic management technologies and more spectrum. (AT&T Mobility just posted that its 2011 mobile data traffic doubled over 2010 continuing a trend stretching back to 2007.) According to Cisco, in 2011 global mobile data traffic more than doubled--2.3 times growth, or 133 percent--and Cisco projects that it will double again in 2012, but at a slightly lower rate of 110 percent growth.

London Coverage (modelled at 24dBuV/m)



Number of Calls by Site (24 hour day)

Normal week day and 'day of action' comparison



Average call duration: 34 sec