Optimising Passenger Data Services on Public Transport

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Icomera in brief

- Leading provider of passenger Internet solutions for the transportation industry
- More than 2000 systems deployed
- Customers on five continents
- 20 million users

Optimising Passenger Data Services on Public Transport

The challenges of providing a mobile data service

- Data coverage, route surveys, multiple network fail-over/load balancing, bandwidth aggregation

Passenger expectations

- Trends of public transport passengers, mobile data service users and network advancements

What is being provided now and how is it managed

- Icomera standard solution offering including the Moovbox M220 and MoovManage centralised management system

The JANET passenger transport project - its approach and aims

- The Icomera Moovbox M220 and Eduroam, testing, development and deployments

Where are we heading with passenger internet and data access

- What the future holds for mobile data services, Icomera and JANET integration

The challenges of providing a mobile data service

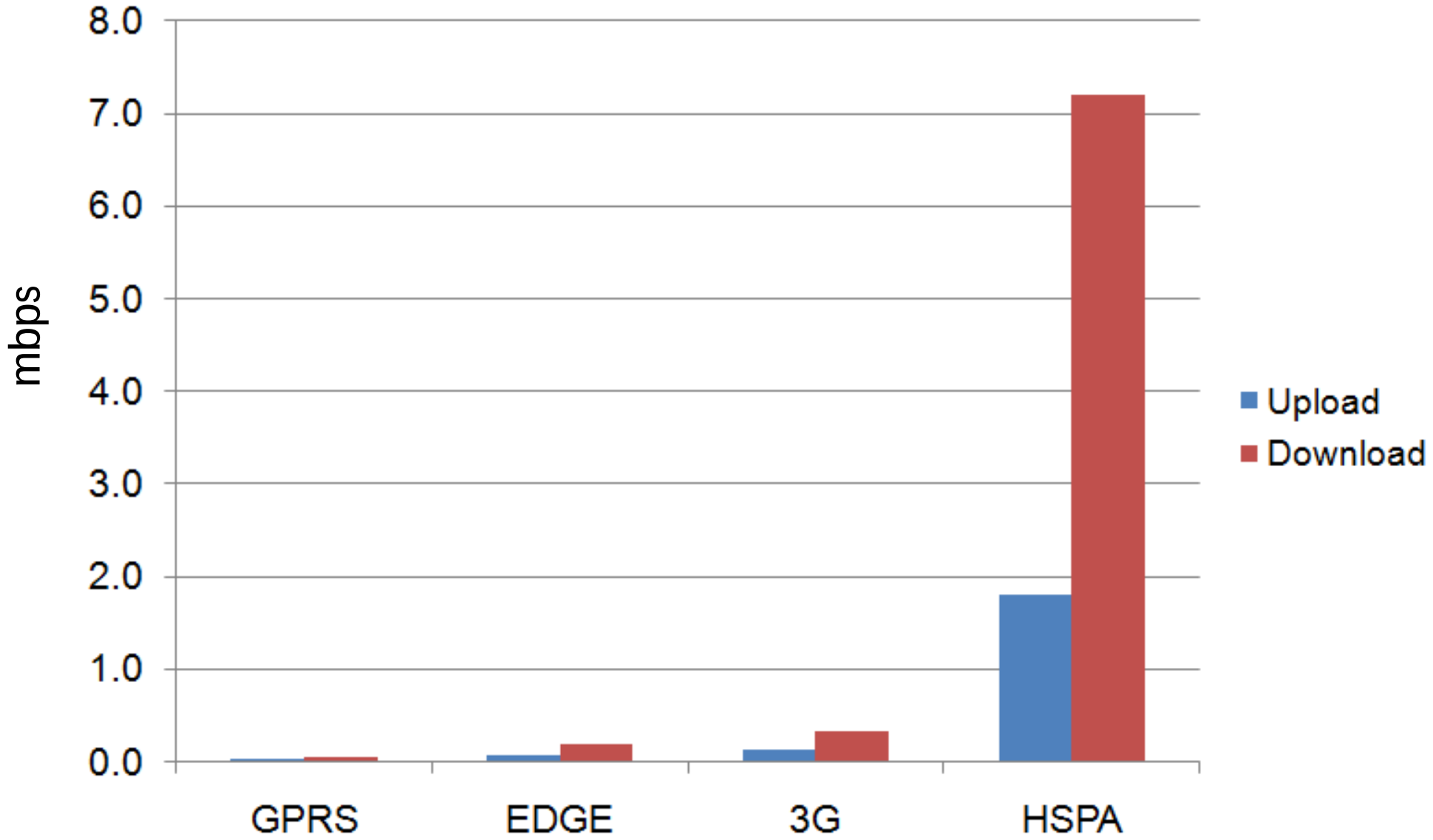
Mobile data background

- The majority of mobile data services in the UK are offered by the mobie carriers, O2, Vodafone, T-Mobile, Orange and Three.
- They all support similar networks
  - GPRS – Upto 48 kbps download 9.6 kbps upload
  - EDGE – Upto 200 kbps download 80 kbps upload
  - 3G – Upto 335 kbps download 130 kbps upload
  - HSPA – Upto 7.2 mbps download 1.8 mbps upload

Some smaller operators are testing WiMAX with support a maximum throughput of 30 mbps, but realistically the users will not see more than 5-6 mbps

The challenges of providing a mobile data service

Mobile data speeds



The challenges of providing a mobile data service

Coverage

There are many issues the mobile operators must overcome when deploying their wide area wireless networks.

- The local geography
  Hills, the lay of the land
- Clutter
  Local buildings, trees
- Site costs
  Rent, contractual agreements, installation
- Bandwidth
  Capacity of the mobile data networks, upgrades constantly required to improve speed and keep up with demand.

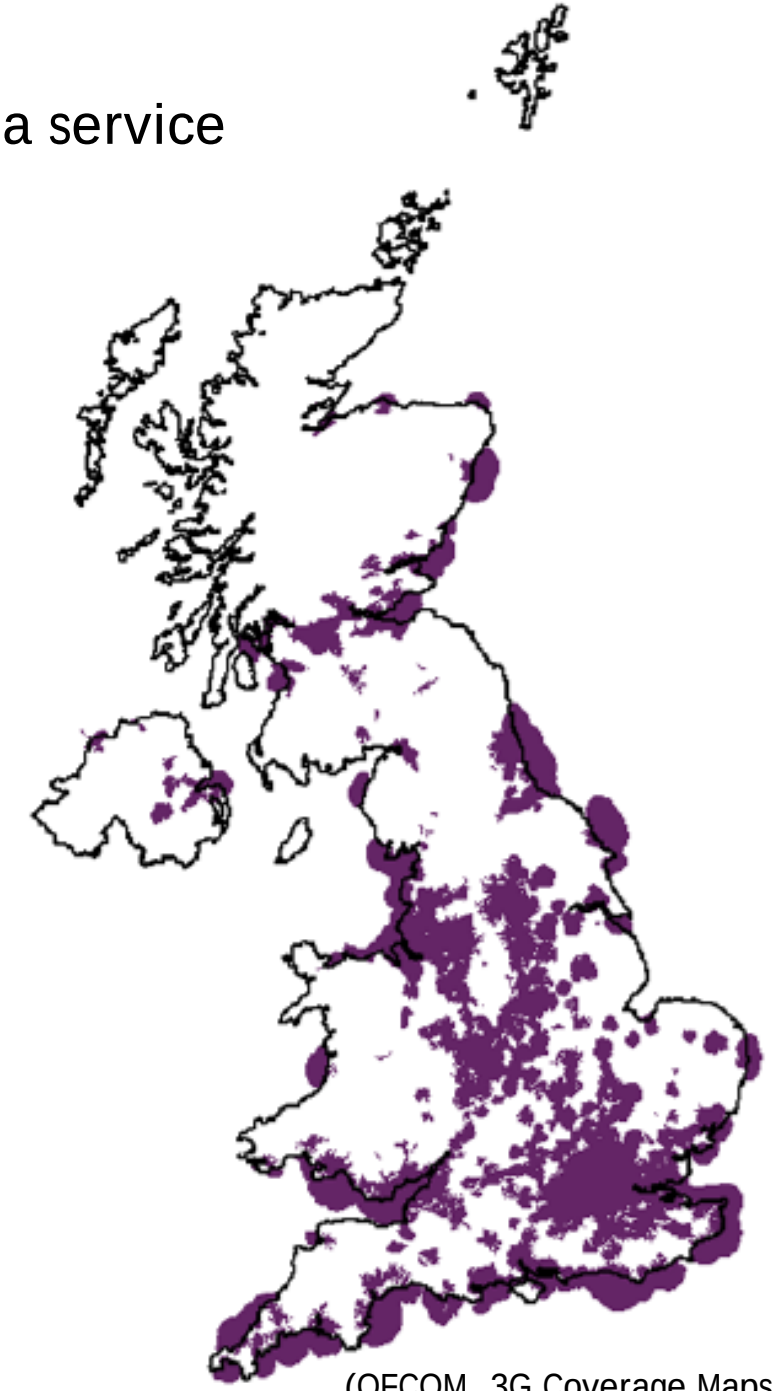
The result of these issues mean only 60% of the UK have 3G coverage.

However 93-97% of the country is covered with GPRS.

The challenges of providing a mobile data service

O_2 Coverage maps

The map shows an overview of the combined 3G coverage for 0_2

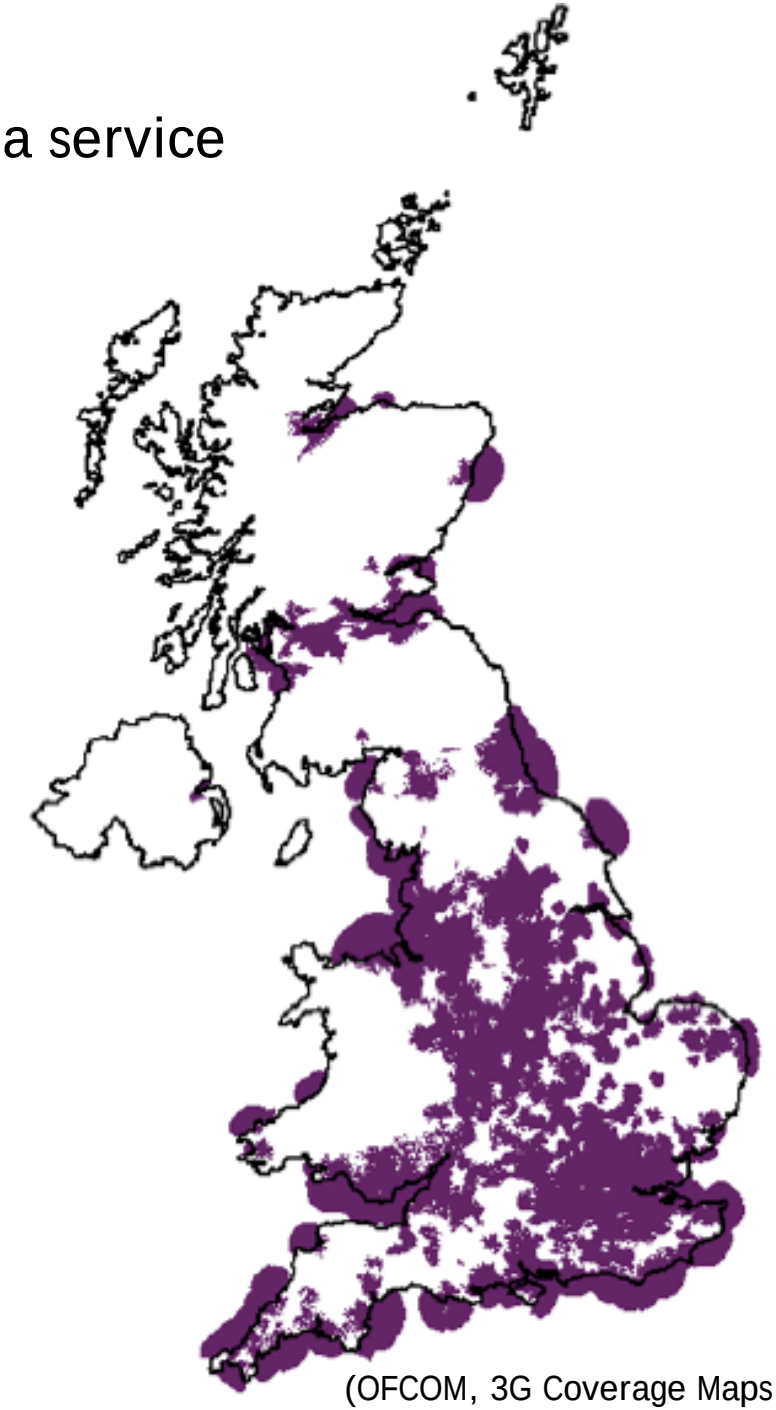


(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

T-Mobile Coverage maps

The map shows an overview of the combined 3G coverage for T-Mobile

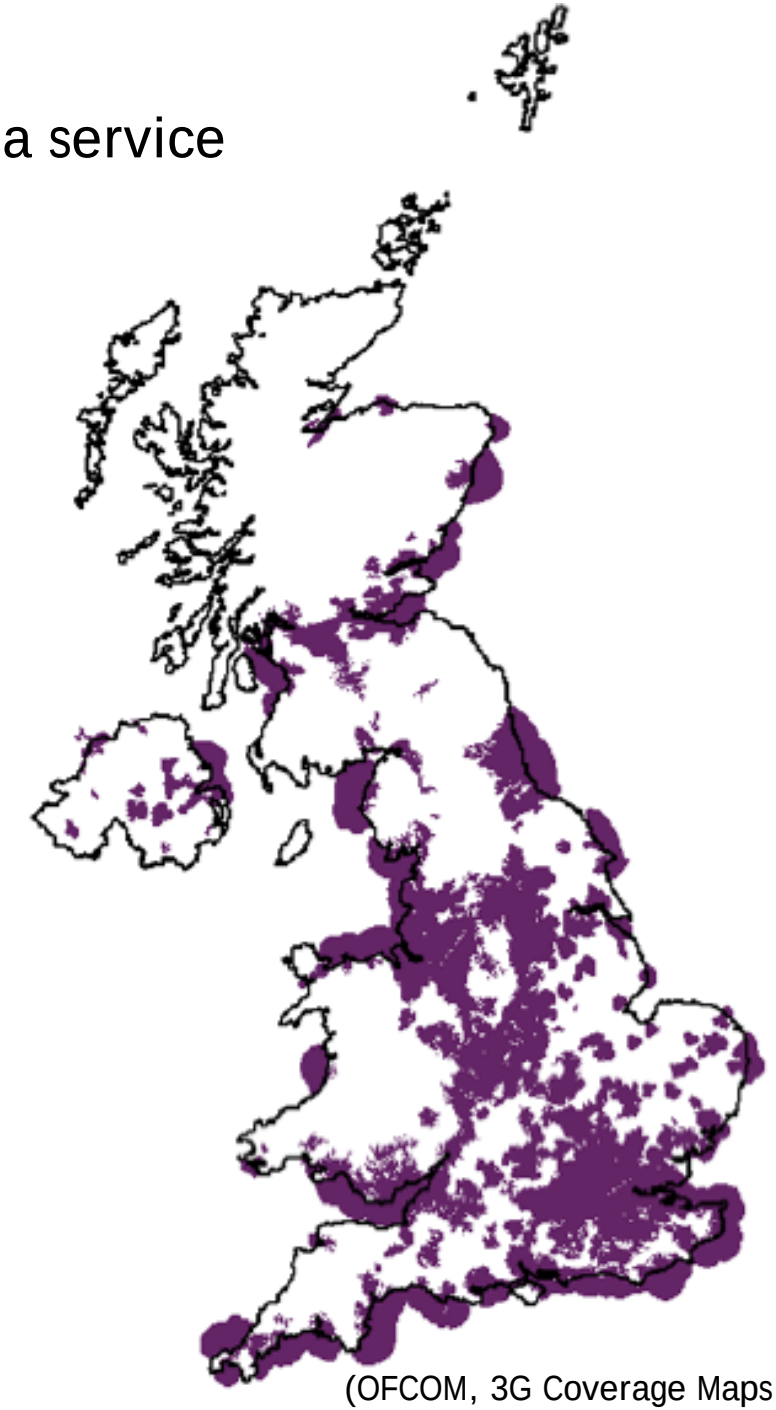


(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

Vodafone Coverage maps

The map shows an overview of the combined 3G coverage for Vodafone



(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

Three Coverage maps

The map shows an overview of the combined 3G coverage for Three

(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

Orange Coverage maps

The map shows an overview of the combined 3G coverage for Orange

(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

Coverage maps

The map shows an overview of the combined 3G coverage of all the major mobile operators using Icomera seamless switching SureWAN.

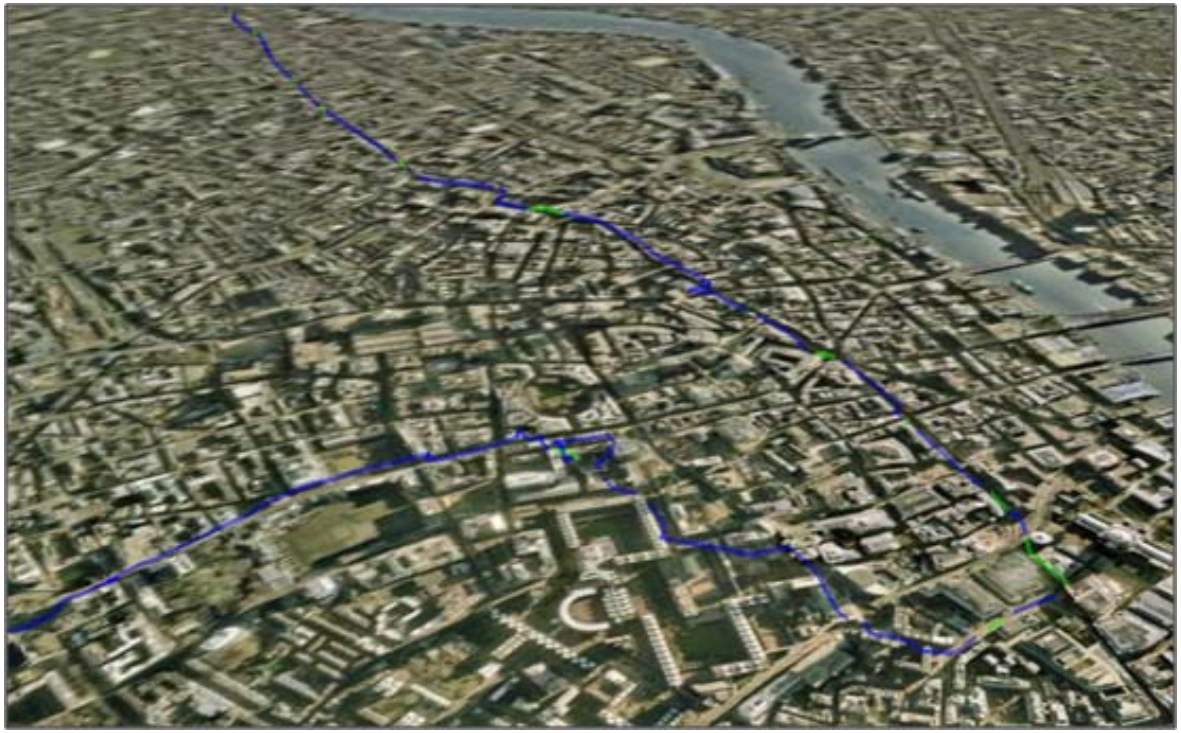
(OFCOM, 3G Coverage Maps,8 July 2009)

The challenges of providing a mobile data service

Coverage maps with the Moovbox and MoovManage

So how do we confirm this?

Using the Icomera Moovbox and MoovManage central management system we can measure mobile operator network type and signal strength to create WAN coverage survey.



The challenges of providing a mobile data service

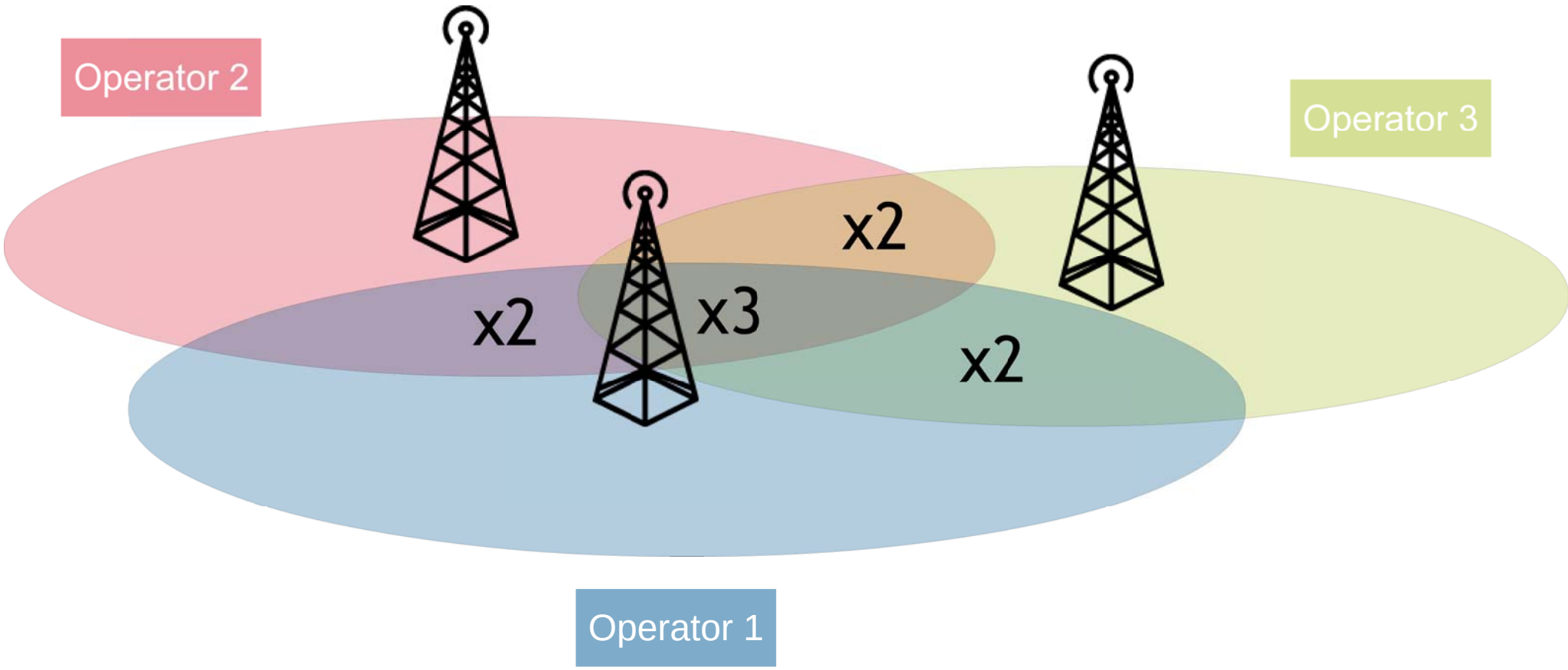
Optimising mobile data services

Icomera is the market leader in optimising mobile data services utilising multiple data networks.

- Fail-over
  - Ability to fall from 1 network to another
- Bridge mode
  - Concurrent connections linked directly to an interface, e.g. Ethernet, Wi-Fi
- Load balancing
  - Sharing the Moovbox load between concurrently connected modems
- Aggregation and seamless handover via SureWAN
  - Tunnelled back to a central location, aggregating multiple connections

The challenges of providing a mobile data service

Optimising mobile data services via SureWAN



The challenges of providing a mobile data service

Utilising mobile data services

Cashe pages

Image compression

Local content

Passenger expectations

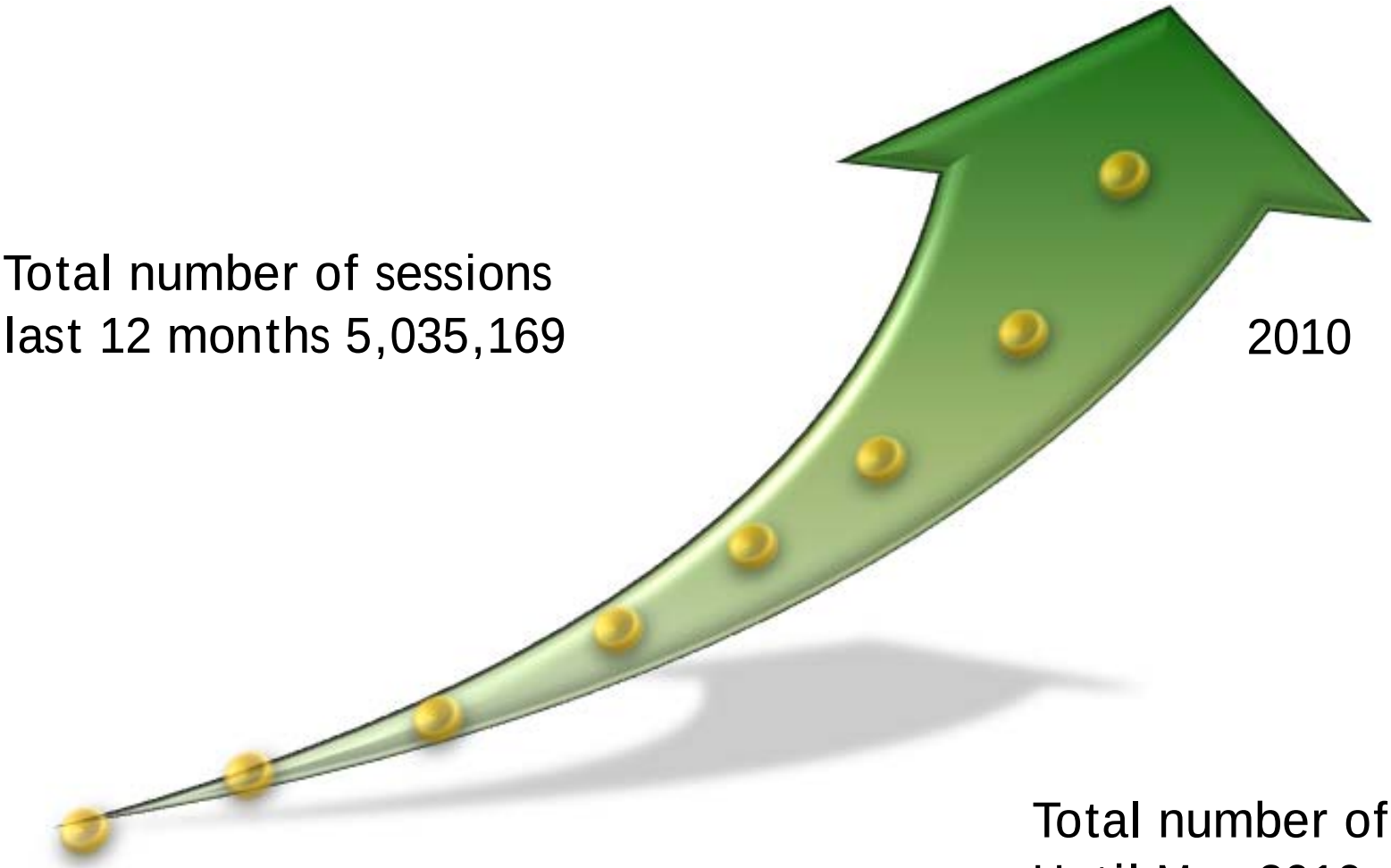
Trends of public transport passengers

- Passenger expectation are increasing all the time.
- Home broadband speeds have increased 10 fold in the last 5 years.
- Passengers expect Wi-Fi on the move and demand a high level of service.

- Recent growth in users:
  - *Smart phones*
  - *Tablet PCs*
  - *Low price netbooks*

Passenger expectations

Trends of public transport passengers



Passenger expectations

Mobile data service users and network advancements

LTE, WiMAX

Merger of Orange and T-Mobile

Fibre networks

What is being provided now and how is it managed

Icomera standard vehicle solution offering

Icomera has a standard road vehicle solution offering

- Icomera Moovbox M220, with optional single or dual cellular back-haul solution
- Icomera approved external mount GPS and cellular antenna
- MoovManage centralised management system
  - *Remote monitoring and configuration of multiple Moovbox devices*
  - *Control of user access to Wi-Fi services via a custom web splash page or 'portal'*
  - *Real-time reporting on device status, performance, and usage statistics*
  - *Optional GPS-based device tracking*
- Ability to offer second SSID for eduroam integration

The JANET passenger transport project

The Icomera Moovbox M220 and eduroam

Project Outline

- Approach coach operator market to gauge interest in running an eduroam trial
- Identify routes/operators with which to conduct a trial in the following classes:
  - Existing free Wi-Fi service on a route between two university towns/cities
  - No previous Wi-Fi service on a route between two university towns/cities
- Develop and demonstrate eduroam authentication from Moovbox hardware
- Run a 12 month trial on routes identified above and report usage
- Evaluate whether or not eduroam availability has an impact on sales and/or is used preferentially to any alternate free Wi-Fi offering.

The JANET passenger transport project

The Icomera Moovbox M220 and eduroam

What is eduroam

eduroam (education roaming) is the secure, world-wide roaming access service developed for the international research and education community.

eduroam allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop.

(http://www.eduroam.org/,8 April 2011)

The JANET passenger transport project

The Icomera Moovbox M220 and eduroam®

What is eduroam continued…

- The eduroam initiative started in 2003 by, TF-Mobility.
- The task force created to test the feasibility of combining a RADIUS-based infrastructure with 802.1X standard technology to provide roaming network access across research and education networks.
- Initial test was included institutions located in the Netherlands, Finland, Portugal, Croatia and the UK. Later, other national research and education networking organisations embraced the idea, which was then named eduroam.

(http://www.eduroam.org/,8 April 2011)

The Icomera Moovbox M220 and eduroam®

What is eduroam continued…

- eduroam allows any eduroam-enabled user to get network access at any institution connected to eduroam. Depending on local policies at the visited institutions, eduroam participants may also have additional resources (for example printers) at their disposal.
- eduroam technology is based on 802.1X standard and a hierarchy of RADIUS proxy servers.
- The role of the RADIUS hierarchy is to forward the users' credentials to the users' home institution, where they can be verified and validated.

(http://www.eduroam.org/,8 April 2011)

The JANET passenger transport project

The Icomera Moovbox M220 and eduroam®

How eduroam and Icomera combine

- The Moovbox has an unsecured wireless network broadcasting on a vehicle.
- The passengers can connect via a customisable captive portal.
- An eduroam SSID is setup on a second SSID with 802.1x authentication enabled.
- eudroam users will automatically connect to the eduroam SSID.
- eudroam users will then enter their login credentials.
- Once connected eduroam users will have unfiltered connectivity and access to any enabled resources.

Where are we heading with passenger internet and data services

What the future holds

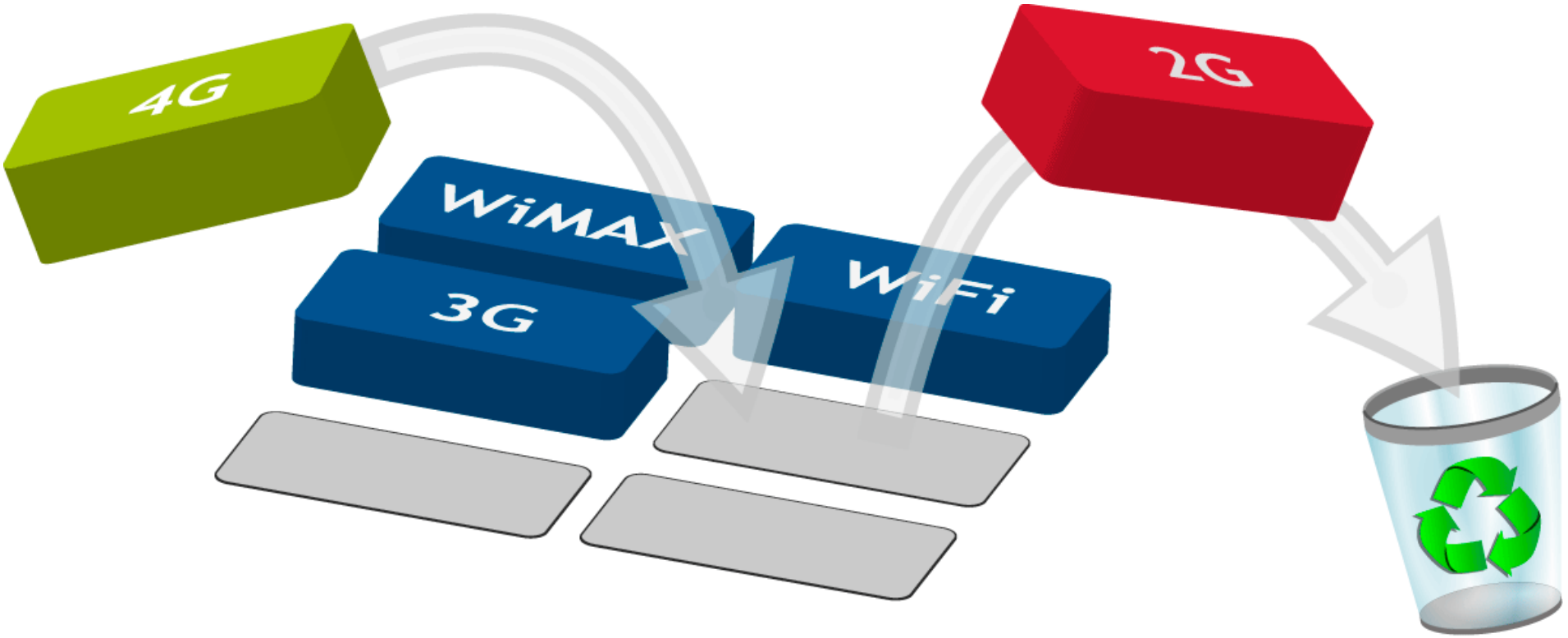
Mobile data services

- WiMAX up to 5-6 mbps services
- HSPA+ up to 22 mbps services
- LTE up to 100 mbps services

Icomera and JANET integration

- National roll-out across entire Icomera Wi-Fi network
- Icomera's back-haul agnostic solutions will always keep up with the latest technology.

Keeping up with technology



Thank you!

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