



postnote

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TECHNOLOGY FOR THE OLYMPICS

From 27th July to 9th September 2012 around 14,500 athletes from 200 nations will compete in the London 2012 Olympic and Paralympic Games. Almost 10 million tickets will be sold and hundreds of millions will view the Games¹ remotely. Technological challenges range from ensuring that every event is available to viewers on-demand, to ensuring that the emergency services' radio network can function reliably. This note looks at technology plans for the Games, focusing on information communications technology (ICT).

Background

In July 2005 London was announced as the host of the 30th Olympic and 14th Paralympic Games. Technology is crucial for handling results (Box 1) as well as other aspects of successfully staging and securing the Games.

- **Communications and Broadcasting:** an extensive infrastructure is needed to allow communications across the 94 locations involved in staging the games as well as broadcasting to the outside world.
- **Security:** technology underpins the security operation, with uses ranging from authentication to search and screening. In addition the ICT infrastructure itself will need to be secured against threats such as hacking.
- **Ticketing and Access:** as well as managing millions of ticket sales, organisers will need to manage access for 250,000 staff, contractors and volunteers.
- **Impact of ICT:** the large ICT network will contribute to the Games' greenhouse gas emissions. Minimising the impact of the Games on climate change was a key part of London's bid.

Financing

The London Organising Committee of the Olympic Games (LOCOG, Box 2) plans to raise around £2 billion (bn)

Box 1 Results Technology

Technology is vital for capturing athletes' performance at the Games and distributing the results to the wider world. The technology used in 2012 will be based on that used in previous Games, with minor modifications. Over successive Games, devices have been developed and refined for each sport, such as electronic timing in sprinting and touchpads in swimming. A suite of specialist software applications is used to manage these devices and to record results. The timings and scores are securely stored and form the official paper flow of information. Although most of the technology for capturing athletes' performance is tried and tested, integrating the data feeds from all sports, and distributing them to relevant users (media, broadcasters, etc) is one of the most complex technological tasks facing the London Organising Committee of the Olympic and Paralympic Games (LOCOG) and its partners ATOS and Omega.

from sponsorship, ticket sales, merchandise, licensing and media rights. The total technology budget for the Games is £500m, around half of which will be raised through sponsor contributions, to provide the core technologies the Games requires. The most complex of these is the results service (Box 1). Note that the LOCOG figure is separate from the £9.3bn provided by the government. Of this around £5.3bn will be spent by the Olympic Delivery Authority (ODA, see Box 2) on building the Olympic venues and regeneration projects.²

Communications and Broadcasting Communications

An extensive ICT infrastructure is required to support the Games. BT has compared the task to "installing a whole new town's worth of telecommunications infrastructure in just over three years". It will enable voice and data communications, TV and broadcast transmission, and mobile services.

Box 2 The 2012 Olympics: Who's Involved?

Below are some of the key organisations involved with technology planning for the 2012 Games.

The London Organising Committee of the Olympic and Paralympic Games (LOCOG) is a privately financed company responsible for planning and staging the Games.

LOCOG's **sponsors** provide goods and services as part of their contract. Some of these, such as **BT** and **Airwave**, will be installing the technology used to stage the Games.

The Olympic Delivery Authority (ODA) is a non-departmental public body which is the responsibility of the Department of Culture, Media and Sport. It is responsible for building the new Olympic sites and providing for their legacy use.

The Olympic and Paralympic Security Directorate (OSD), within the Office for Security and Counter Terrorism, develops and manages the government's security strategy for the Games and associated events.³

Work is underway to install 165,00 fixed telephones, 80,000 fixed and 1,000 wireless Internet points, to serve 94 venues across the UK, connected with over 4,500 km of cabling. LOCOG is coordinating the design and installation of the ICT infrastructure. BT will install most of it, with ATOS Origin responsible for systems integration and Acer providing computing equipment. Testing of ICT infrastructure is vital (see Box 3).

Within this infrastructure, there will be a highly secure network for running the sporting events themselves and storing the official results. The results will be displayed in real time on scoreboards, TV graphics and official websites. This secure network will also be used for other key functions such as accreditation of athletes, coaches and officials. A second network will be used for all other aspects of organising and staging the Games. It will provide the "Olympic Family" (everyone involved in the Games, or in their staging) with:

- broadband and wireless internet access;
- access to a Games-wide information system, ranging from results to transport connections.

The Olympic Family will also have access to a private mobile radio network, provided by Airwave. It will allow users to speak to one or more other users at the same time. It is critical for the day-to-day management of the Games.

Radio Spectrum Management

The "radio spectrum" is the range of frequencies available for communication by radio wave (POSTnote 292). There will be many demands on spectrum at the Games, for example from broadcasters and the emergency services. This presents a challenge, as there is already a high demand for spectrum, particularly in London. In its bid for the Games, government guaranteed that spectrum required by the Olympic Family would be made available without fee. This also covers spectrum required by broadcasters with the rights to show Olympic coverage (such as the BBC). It does not apply to other users such as security and emergency services, public transport and public mobile communications. These

Box 3 Technology Testing at the 2012 Games

All technology (ICT infrastructure, equipment, software) used to stage the Games needs to be reliable and well tested. LOCOG (Box 2) says there will be limited opportunity for innovation in technology systems and services. Only technology which is commercially available and proven to be reliable by the third quarter of 2010 will be used. This is known as the 2010 "technology freeze" or "lock-down".

Installing and testing the equipment and infrastructure required for the Games is challenging, particularly because some venues, such as Wimbledon, will not be accessible until a month before the Games start. Equipment testing will begin in early 2010 and run right through to the Games. This will initially focus on individual pieces of equipment, and then move on to testing infrastructure across a whole venue, and trialling specific sporting events.

Finally, "technical rehearsals" will be held where operational testing will occur at all venues at once, to simulate the busiest days of the Games. A range of situations, from a staff shortage to food poisoning, will be simulated.

users must secure any additional spectrum required for the Games through the existing allocation mechanisms. The communications regulator Ofcom, which allocates radio spectrum in the UK, is responsible for ensuring that the spectrum guarantees are met. It is pursuing a number of strategies, discussed on the next page.

Broadcasting: the First 100% Digital Games

The 2012 Olympics have been described as the first "100% digital Games". UK viewers will be able to watch live and on demand coverage over a digital network (on digital television, or on computers via the Internet). The BBC intends to make available all 4,500 hours of footage live and on-demand. In comparison, at the Sydney 2000 Olympics, only 250 out of 4,000 hours of footage was shown on terrestrial TV. Providing multimedia coverage of the Games represents a logistical and technological challenge, particularly since they will take place only a few months after the completion of analogue to digital switchover in London (POSTnote 264). The focus will be on providing mass coverage rather than trialling cutting-edge technologies. LOCOG says there will continue to be an analogue component to broadcasting at the Games for standard definition channels elsewhere in the world.

Communications and Broadcasting Issues

Public Mobile Phone Network Coverage

Mobile phone network coverage at the Olympic Park and other venues is insufficient to handle the load expected during the Games. LOCOG is facilitating workshops for Mobile Network Operators (MNOs) to help them plan coverage. MNOs say that improved network coverage may be needed elsewhere as a result of the Games, for example at related cultural events, around the BBC's big screens in city centres which will show the Games live, and along the Olympic Route Network (a network of roads to be used by the Olympic Family).

Coverage on the London Underground

The Government's "Digital Britain" report (June 2009) called on network operators and the Mayor of London to provide mobile broadband access on the London Underground in time for the Games. However, in 2007,

Transport for London put out a tender for providing trial mobile phone coverage on the Waterloo and City line. There were no “commercially credible” bids and the trial was cancelled. Providing coverage in deep tunnels is difficult and costly because of engineering constraints.

Footage Recorded by Spectators

By 2012, spectators will routinely be able to share footage of the Games online (captured, for example, by digital cameras and mobile phones) almost in real time. In many cases this may be illegal, but in practice it is difficult to restrict. The organisers are therefore looking at ways to exploit this situation rather than seeing it as a threat – such as encouraging spectators to share their photos and videos via official social networking websites.

Radio Spectrum Availability

In some sectors there are concerns about spectrum availability at the Games. The emergency services say they face problems accessing extra spectrum at an acceptable cost for any large event, not just the Olympics. For example, the Airwave radio network provides secure communications to the police and emergency services. It has been stretched at large policing operations, such as at the 2007 Notting Hill Carnival.⁴ The Home Secretary has said that the capacity of the network will be expanded ahead of 2012 to meet the extra requirements of the Games. In October 2009, a £39m contract was awarded to provide network capability for an additional 8,000 users during the Games. Ofcom is pursuing several strategies to meet the extra demand (see Box 4).

Security and Safety

The government’s safety and security strategy for the Games classifies the threats into four categories: terrorism, serious crime, domestic extremism and public disorder, and natural hazards.³ The Olympic Security Directorate (Box 2) anticipates terrorism to be the most likely threat to the London Games. The Olympic Security Strategy is closely integrated with CONTEST, the government’s Counter Terrorism Strategy. As with all technology for the Games, that used in the security operation will follow existing guidelines to ensure it is proven, reliable and effective and will have to fit within the 2010 technology freeze (Box 3). Thus the technologies used will largely be established ones, for example biometrics (iris scanning, hand scanning) for authentication and CCTV for perimeter control, intruder detection and traffic management.

The security operation will face broad challenges relating to its scale and cost. However, these issues are not explored in this note. Challenges relating directly to the use of technology are discussed in the next section.

Issues related to security technologies

Cybersecurity

There is concern that the ICT infrastructure supporting the Olympics could be attacked electronically (POSTnote 271).

Box 4 Ensuring Radio Spectrum Demand is Met at the 2012 Games

Ofcom is pursuing a number of strategies to cope with the heavy demand for spectrum at the Games. One is **negotiating temporary use of spectrum** from civil and public-sector holders such as the Ministry of Defence. The spectrum released by digital switchover will also be used. However, some equipment used by broadcasters will need to be retuned to work at different frequencies.

Another strategy is to **reduce demand for spectrum**. For example one suggestion made by Ofcom is to give outside broadcast users access to a network around London, to reduce their need for high-power wireless communications.

Another strategy is to encourage users to **operate at different frequencies**. For example most wireless cameras expected to be used at the Games work at around the same frequency (2-4GHz). Ofcom has therefore asked broadcasters to use some cameras that operate at a higher frequency (7GHz) which is used in Japan. However, at this frequency, range is reduced and for some it will mean buying new equipment.

For any given frequency, users usually need a licence from Ofcom to operate equipment legally. Ofcom will police spectrum use at the Olympics to pick up unauthorised radio transmissions. Ofcom and LOCOG will inspect and tag all radio equipment before it is allowed within Olympic venues to ensure it is working within the licence allocation.

Attackers could range from individuals to well organised criminals. It is thought less likely that terrorists would use electronic methods. A successful attack could disrupt events, falsify results or allow access to the information held on spectators and the workforce. However, very few attempts to breach computer security at previous Games have succeeded. There were over 5 million electronic security alerts during the 2006 Turin Winter Games, the overwhelming majority of which were benign. Only 20 were considered critical and none of those affected the running of the Games.

In addition to standard measures to prevent malicious access and the spread of computer viruses, the network used to run events and store results will be kept physically separate from the rest of the network. It will be able only to send results out to the Internet but not to receive data. Atos Origin says that there have been no successful attempts to gain access to the Games’ network at previous Olympics.

Public Security Online

Large sporting events give rise to online scams. There is already evidence that this is occurring ahead of the London Games. Criminals aim to steal either money or personal information from members of the public. The official London 2012 website gives guidance on how to “stay safe online”.⁵ Attacks can take the following forms:

- fake ticket websites: over \$1.5 billion in Europe alone is reported to have been lost through such websites before the Beijing Games;
- spam emails, claiming to be sent from an organisation connected with London 2012. They typically claim the recipient has won a prize and must either send money or provide personal details to receive it. LOCOG have documented around 30 such scams already.

Ticketing and Payment

Around 9.2 million tickets will be sold for the Olympic and Paralympic Games. LOCOG has selected Ticketmaster UK to manage ticket sales and distribution. A ticketing strategy and the choice of ticketing technology (paper or electronic) will be announced in 2010.

Ticketing and Payment Issues

Integration with the Oyster Card

To encourage people to travel by public transport, ticket holders will travel free on the day of the competition. There has been speculation about whether tickets will be integrated with the Oyster Card. Although this is technologically feasible, LOCOG says that the expense is likely to be too high, given that the Games are a temporary event. LOCOG is working with Transport for London to discuss how free travel will operate in practice.

Payments at the Olympics

As part of Visa's Olympic sponsorship arrangement, it will be possible to use only Visa cards, or cash, to pay for goods and services within Olympic venues. By 2012, a large proportion of Visa debit cards in the UK will be integrated with a "contactless" payment mechanism for low value payments. This means that a card will not have to be inserted physically into a reader for data to be read. Instead, it is held against a secure contactless reader to make the payment in under a second. The payments industry uses a specially developed "Proximity Payment Standard" for communicating data using Radio Frequency Identification (see POSTnote 225). For security, the reading range of the card is restricted to ~4cm and the payment is secured by chip and PIN technology. Those who do not have a Visa card will be able to buy a Visa prepaid card or pay using cash. There has been much media interest in the prospect of a completely "cashless" Games where all purchases at Olympic venues are made by card only. However Visa and LOCOG stress that this is not the case. Cash will also be accepted and cashpoint facilities will be available.

Impact of ICT Used at the Games

Emissions Reduction

Minimising the impact of the Games on climate change was a key part of London's bid. The ICT network, and in particular, energy intensive data centres used to support the Games, will contribute to emissions. POSTnote 319 discusses ways of reducing emissions from ICT. LOCOG says that after the 2010 lock-down (Box 3), they will be in a position to state what they are doing in this area.

Technology Legacy

The Games' legacy formed an important part of London's bid. The main ambitions are to stimulate the regeneration of East London and to widen sporting participation in the UK. There were no specific plans set out for a technology legacy. However, some industry representatives and local organisations in the Olympic Boroughs, hope there will be opportunities to derive wider benefits from the Games in addition to direct procurements. This could involve:

- re-using data centres and CCTV control centres;

- reusing technology and expertise at future major events in the UK;
- improving physical and digital infrastructure, such as extending broadband access in the Olympic Boroughs.

There has been criticism from industry that none of the organisations responsible for legacy has a specific mandate to consider technology. As a result there is not enough stakeholder communication to maximise the benefits of technology procured for the Olympics. LOCOG says that as much of the technology is unique to the Olympics, a natural legacy is hard to identify, other than for subsequent Games. However, there will be some lasting benefits. For instance, the traffic management technology (CCTV and automatic number plate recognition) used on the Olympic Route Network will be taken over by Transport for London after the Games. Also, LOCOG is looking at re-use of its equipment and expertise at the 2014 Glasgow Commonwealth Games.

Overview

- The 2012 Olympic Games will rely heavily on Information Communication Technology (ICT) to stage the Games and to distribute results. Around £500 million will be spent by the Games' organisers on technology.
- The main technological challenges arising from the 2012 Olympics relate to the scale and complexity of the Games rather than use of "cutting edge technologies". The emphasis will be on tried and tested technology.
- Key challenges include management of radio spectrum, ensuring the Games are not vulnerable to physical or electronic attack and minimising emissions from ICT used at the Games.
- Better coordination is needed between industry, organisers and the local community to ensure that the technology used at the Games has long term benefits.

Endnotes

¹ In this note, "the Olympics" and "the Games" are used as shorthand for the London 2012 Olympic and Paralympic Games.

² For further information see *Financing the London 2012 Olympic Games*, House of Commons Library, SN/SG/3790, June 2009.

³ Home Office, *London 2012 Olympic and Paralympic Safety and Security Strategy*, July 2009

⁴ House of Commons Home Affairs Select Committee, Seventh Report of 2007-8, *Policing in the 21st Century*, HC 364-I

⁵ See <http://www.london2012.com> for further information

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