

52nd FITCE Congress in Leuven, Belgium - well on track.

Leuven FITCE 2013.

[Congress Website](#)

Message from the President.

Dear Fitce friends,

Finally it seems that spring has set in. That means that temperatures rise and that everywhere new life seems to blossom. I hope that reflects a bit on Fitce as well.

For the first time we have a Fitce congress which we can call a multi-partner event. Fitce co-operates with the Catholic University of Leuven and some other commercial organizations. Under the congress website you can find the related details. We will have an impressive number of quality speakers. The general idea is that attending this congress will give you a clear and complete insight and understanding of the issues concerning security and safety in the cyber-world.



Jos Gerrese FITCE
President

We hope to meet you in large numbers. The technical and the social program are attractive and Leuven is a very nice city.

I am very pleased to see that some national Associations are organizing internal as well as bi/tri-lateral seminars or similar events. For instance the Italians organized in June a seminar which took place in Milan with the Greek, and the Spanish Fitce organizations. We also see good activities in Belgium and Austria.

A new possibility is that Fitce has joined the EIF (European Internet Foundation) which gives our members the possibility to participate in activities like for instance <http://ec.europa.eu/yourvoice>. Our Liaison officer and the Secretary General (a.i.) have started to distribute related information on EU, ETNO and ETSI activities via the national contacts.

This is all positive news. I am however worried about the rapid decrease of membership in various countries. Since that also effects our flow of income we need to watch our financial situation very careful. The coming months will be used to find answers and measures to face these developments.

For the time being I wish you a pleasant summer and I expect to meet many of you in Leuven 4-7 September!!

Ir. Jos Gerrese
FITCE President.

Welcome to Leuven.

The International Cyber Security Strategy Congress 2013 "Moving towards Trustworthy Digital Ecosystems" is co-organised by FITCE and a number of top-of-the-crop organisations with a vast interest in security at large.



Jos Dumortier
Congress Chairman.

The Congress is a great opportunity to meet academia, ICT and Security professionals and their partners.

The Congress – the 52nd in a row – is being hosted by the University of Leuven which has the reputation to be at the top of interdisciplinary security research in Europe. This conference will take place in the Aula Pieter De Somer from 4 till 7 September 2013. The gala dinner will be enjoyed in the historical setting of the Beguinage at the Faculty Club.



Leuven as a University city combines a series of well-preserved historical buildings in the heart of the city with new architectural developments to underline its

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ambition of fast growing centre of innovation and growth. Information systems are becoming ever more pervasive. They play a crucial role in the infrastructure of our society (communications, government services, financial sector, transport and other public facilities) and in our individual life (health, entertainment, home automation, etc.).

The growing dependence on these IT systems implies that we impose higher requirements on the security and robustness of these systems.

Security of information systems concerns everybody and can only be tackled by taking an interdisciplinary, holistic approach.

The objective of this Congress is to provide, via keynotes and tutorials, an overview of the state-of-the-art, best practices and policy perspectives to a wider audience that is not necessarily specialised in information security.



Prof. Jos Dumortier.
Chairperson.
FITCE Congress 2013.

Partners Program. FITCE 2013.

The charming city of Leuven lies close to Brussels and is situated centrally in Belgium which allows for an attractive partners program. This year on the Partners Program, on Thursday a trip to Brussels, on Friday we have a guided panoramic tour at Namur.

Wednesday 4/9/2013

15:00 – 17:00 Registration open in Aula Pieter De Somer
17:00— 19:00 Reception at Leuven Town Hall.

Thursday 5/9/2013

09:30 – 13:00 Official opening of the Congress
14:00 – 18:00 Visiting Brussels by bus and on foot, savouring the Food & Culture of the Region

Friday 6/9/2013

08:30 – 17:30 Panoramic tour of Namur by coach;
Cruise on the Sambre/Meuse; visit the Citadel - Fortified Estate -with the little touristic train
19:30 – 20:00 Reception at Faculty Club, Beguinage
20:00 - 24:00 Gala Dinner – Faculty Club.

Visiting Brussels

Brussels is the capital of Belgium and the de facto capital of the European Union (EU). It is also the largest urban area in Belgium, comprising 19 municipalities, including the municipality of the City of Brussels, which is the de jure capital of Belgium, in addition to the seat of the French Community of Belgium and of the Flemish Community.

Brussels has grown from a 10th-century fortress town founded by a descendant of Charlemagne to a sizeable

city. The city has a population of 1.1 million and a metropolitan area with a population of over 1.8 million, both of them the largest in Belgium. Since the end of the Second World War, Brussels has been a main centre for international politics. Hosting principal EU insti-



tutions and the headquarters of the North Atlantic Treaty Organization (NATO), the city has become the polyglot home of numerous international organisations, politicians, diplomats and civil servants. (Source: Wikipedia).

Pictures of the panoramic tour of Namur.

Namur is a city and municipality in Wallonia, in southern Belgium. It is both the capital of the province of Namur and (since 1986) of Wallonia.

Namur stands at the confluence of the Sambre and Meuse rivers and straddles three different regions - Hesbaye to the north, Condroz to the south-east and Entre-Sambre-et-Meuse to the south-west. The language spoken is French.

The town began as an important trading settlement in Celtic times, straddling east-west and north-south trade routes across the Ardennes. The Romans established a presence after Julius Caesar defeated the local Aduatuci tribe.

Namur came to prominence during the early Middle Ages when the Merovingians built a castle or citadel on the rocky spur overlooking the town at the confluence of the two rivers. In the 10th century, it became a county in its own right. The town developed somewhat unevenly, as the counts of Namur could only build on the north bank of the Meuse - the south bank was



owned by the bishops of Liège and developed more slowly into the town of Jambes (now effectively a suburb of Namur). In 1262, Namur fell into the hands of the Count of Flanders, and was purchased by Duke Philip the Good of Burgundy in 1421. (Source: Wikipedia).

Congress Technical Program.

The following Congress Technical Program will be updated from time to time as more speakers are confirmed. The most up to date program will be at the [Congress Website](#).

Wednesday 4 September 2013

Pre-Conference Day

15:00-17:00	Registration KU Leuven, Aula Pieter De Somer, De Beriotstraat, Leuven
17:00-19:00	Opening reception in the Town Hall (offered to the congress delegates by Mr. Louis Tobback, Mayor of the City of Leuven)

Thursday 5 September 2013

8:30-9:30	Registration KU Leuven, Aula Pieter De Somer, De Beriotstraat, Leuven
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Day 1 Opening Keynotes.

9:30-10:00	Opening keynote by Mr. Elio Di Rupo, Prime Minister of Belgium (tbc): "Securing Cyber Space" The Prime Minister has been invited to develop the next steps planned by the Belgian Federal Govern-
10:00-10:30	An academic vision on cyber security in the future: "Self evolving defenses against self evolving malware" , by Prof. dr. Yvo Desmedt, Jonsson Distinguished Professor at the Department of Computer Science of the University of Texas at Dallas
10:30-11:00	Insights in the Hackers Community: "Anonymous And The Future Of Hacktivism" , by Mrs Parmy Olson, Forbes (San Francisco) journalist and author of the recent bestselling book "We Are Anonymous: Inside the Hacker World of LulzSec, Anonymous, and the Global Cyber Insurgency" (2012)
11:00 – 11:30	Coffee break

11:30-12:30	<p>National Cyber Security Strategies : Best Practices <i>Moderator: Bart Preneel.</i></p> <p>Three leading representatives from Europe, Canada and Australia will present national cyber security strategies that are worldwide considered as the "best practice" in the field.</p> <ul style="list-style-type: none"> • The Netherlands: Elly van den Heuvel (tbc), General Manager of the Dutch National Cyber Security Centre • Canada: Leading representative of the Ministry of Public Safety on the Action Plan 2010-2015 for Canada's Cyber Security Strategy • Australia: Carolyn Patteson (tbc), Executive Manager of the Australian Cyber Security Centre
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12:30-14:00	Lunch walking buffet
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14:00-14:30	<p>Afternoon Keynote 1. Mr Gilles de Kerchove d'Ousseghem, EU Counter-terrorism Coordinator at the Council of the European Union (tbc)</p>
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	A European Cyber Security Strategy	Threats and challenges in the Smartphone era.
14:30-15:30	<p><i>Moderator: tbc</i></p> <p>Three leading representatives of relevant European institutions present their views on the development of a cyber-security strategy at the EU level</p> <ul style="list-style-type: none"> • European Commission DG Connect • Europol – European Cyber Crime Centre • ENISA : Steve Purser 	<p><i>Moderator: Wim Van der Bijl – Capgemini</i></p> <p>Three experts will present their view on threats and security challenges with mobile devices</p> <ul style="list-style-type: none"> • Cyber defense: challenges and approaches – Gabi Dreo Rodosek – Universität der Bundeswehr • Telecom security in the era of explosive smartphone growth – Huib Ekkelenkamp – ATOS • Security threats on modern smartphone platforms – Rene Mayrhofer – Upper Austria University

16:00–16:30	Afternoon Keynote 2. tbc	
	International Cyber Security Cooperation	Security impact on ICT architectures
16:00–17:00	<p>Moderator: speaker from OECD.</p> <p>Three speakers from the US, Europe and Australia will present their view on cyber security cooperation at the global level</p> <ul style="list-style-type: none"> • US Erik Barnett (US Home Affairs) or John Bird (US Homeland Security) • EU: DG HOME or EEAS) • Australia: speaker tbc 	<p>Moderator: Jan Goossenaerts - Wikinetix</p> <p>Three speakers will present their view on security and the impact on ICT architectures</p> <p>Security impact on managed and outsourced ICT – Edward Smith – BT</p> <p>Converged network architecture for critical infrastructure protection – Michael Weingartshofer – A1 Telecom</p> <p>All purpose attack platforms on the internet – Andreas Berger – University of Vienna</p>
18:00-1930	Networking Reception.	

Friday 6th September 2013.

Day 2 Opening Keynotes.

9:30–10:00	Cecilia Malmström (tbc), European Commission, Commissioner Home Affairs	
10:00-10:30	Speaker tbc	
10:30–11:00	Speaker tbc	
11:00-11:30	Coffee break	
	Hit by a Cyber Attack: What Did We Learn?	
11:30-12:30	<p>Moderator: Christian Van Heurck or Luc Beirens</p> <ul style="list-style-type: none"> • The KPN Case: Dennis De Geus, KPMG, formerly Chief Information Security Officer of KPN • Lessons learned from cyber-attacks in the banking sector: speaker tbc • Speaker tbc 	
12:30-14:00	Lunch walking buffet	
14:00-14.30	Afternoon Keynote 1. <i>Speaker tbc</i>	
	Enterprise Information Security Governance: Why Do You Need It?	
14:30-15:30	<p>Moderator: Mrs. Ann Mennens, Manager B-CCENTRE</p> <ul style="list-style-type: none"> • Ernst & Young • Speaker tbc • Speaker tbc 	
15:30-16:00	Coffee break	
16:00-16.30	Afternoon Keynote 2. <i>Speaker tbc</i>	
	Creating Trustworthy Digital Ecosystems: How Do You Do It?	
16:30-17:30	<p>Moderator: Marc Vael, Chief Audit Executive, SMALS, Brussels, Vice-President ISACA.</p> <p>Each of the three speakers will present a case report of an enterprise-wide information security action</p> <ul style="list-style-type: none"> • Marc Sel, PricewaterhouseCoopers • Speaker tbc • Speaker tbc 	
20:00-24:00	GALA dinner – Faculty Club	

Saturday 7th September 2013.

10:00–11:00	FITCE General Assembly at Faculty of Law – Big meeting room, College De Valk
11:00–12:00	Congress Conclusions at Faculty of Law – Aud. Zeger van Hee
12:00–14:00	<i>Walking Lunch buffet at Main Entrance hall – Faculty of Law</i>

Registration.

Registration for participation will be available online starting from mid-June at our [Congress Website](#).

Register online using our secure server. If you pay by credit card (American Express, MasterCard or VISA), you will automatically receive a receipt by email.

We will be happy to answer your questions by e-mail: nicole.verbiest@kuleuven.be and look forward to meet you'll in Leuven.

Congress Prices.

Registration Fees (€) VAT incl.		Before July 15th 2013	Before August 15th 2013	After August 15th 2013
Full congress	Member of one of the co-organising parties	385	475	550
	Non member of one of the co-organising parties	550	650	750
1 day only	Member of one of the co-organising parties	150	200	250
	Non member of one of the co-organising parties	225	300	350
Student	Two days (excl. gala dinner)	90	150	200
	One day (excl. gala dinner)	60	100	150
Accompanying person(s)	With members delegate (/person)	200	250	300
	Non members delegate (/person)	300	350	400
Extra option	Gala dinner (extra invitation)	150	150	200
Speaker and Invited Persons		Free	Free	Free

Co-Organisers.



The Austrian FITCE Summer Event 2013!

It is now the 5th time that FITCE Austria has organised its special summer event. Once again, the combination of symposium and family program was very successful. The Hotel Veltlin in Poysdorf, located in a wine-growing district about 1 hour drive away from Vienna, offered the perfect setting. For the family program we took advantage of the Lower Austria Provincial exhibition entitled „bread & wine“.



Attendees at the Event

„All around Smartphones“ was the title of the symposium, and it started with the presentation of Markus Meissner, Sales Director Terminals, ZTE Austria. He gave us an overview as to how Smartphones are developed at ZTE and paid special attention to this. ZTE has produced and sold mobile phones for 15 years, and in 2012 they were ranked number 4 in the world for production. That means that they have produced more than 65 million devices. But ZTE has a huge goal. They would like to become number 3 by 2015. To attract customers they attach special importance to design and usability. ZTE has at the moment about 3.100 patents worldwide for mobile phones.

After the presentation all participants were excited to see and feel the new models of ZTE's „Grand“ and „Blade“ collection.

The next presentation showed how to use Smartphones in the future.

Matthias Baldauf, Research Institute for Telecommunications (ftw) started his speech „interaction with mobile devices“ by explaining to us the bridge between real and digital information. Today Smartphones are small high tech computers – or multifunctional tools, which we do not want to miss in our everyday life. Everybody uses mobile services and more and more also to interact with the environment.

„The future of mobile applications and the ability to inter-



Enjoying the demonstrations..

act should offer a natural and seamless interaction between human, environment and digital devices“, stated Mr. Baldauf. The goal is that the importance of devices will take a back seat and the information will be the key interest.

Mr. Baldauf demonstrated some interaction prototypes, which have been realised together with A1 Telekom Austria in a research project named „Priamus“ (Pervasive Interaction with Ambient Urban Screens). The goal of Priamus was to show how Smartphones can be used as

user interface for interactive devices i.e. shop windows. During the demo session the participants had the opportunity to test it with their own smartphone.



Fun and Recreation.

Meanwhile the children and all people who were not so interested in Smartphones went to visit a castle ruin and had a tour there.

On Saturday at the summer event we always have a group activity together. So we went to an exhibition and had an interesting conducted tour about the development and processing of bread. At least we discovered at the open-air-exhibition ground some ancient houses from the early ages.

We strongly realise that business people, even in higher positions, would like to spend their evenings and weekends with their family. At the FITCE summer event we offer them the possibility to learn about trends and to have their family around them at the same time.

Indeed this year we received very positive feedback, which has strengthen our motivation to continue with this kind of event in the future.

Susanne Blaha,
FITCE Austria.

175 Years of Telecommunications in the UK

2012 was an important year for the United Kingdom. Not only did it contain the diamond jubilee of the Queen's rein, and the highly successful Olympic and Para-Olympic games, but it also featured the celebration of 175 years of telecommunications in the country. A number of important anniversaries of engineering achievement have coincided to make the last year worthy of note in the telecommunications world.

To begin, there is the 175th anniversary of the demonstration of the first practical electric telegraph by Cook and Wheatstone to the directors of the London and Birmingham Railway in 1837 – arguably, the start of the telecommunications. Then there was the birth of Alec Reeves in 1902, an inventor who through his work on coding, including the all-important conversion of analogue signals to PCM in 1937, established the dawn of, what we now recognised a the “digital age”. It's hard to believe, but it was a 100 years ago, that the first automatic telephone exchange was opened in Epsom, England. Finally, 50 years ago, in 1962, transoceanic telecommunications became a reality with the first successful transmission of live television between the USA, France and the UK via the satellite TELSTAR. In addition 2012 is the centenary

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Message from FITCE Marketing Working Group

Dear FITCE Friends,

The 2013 Congress is almost here.

This year we will be focusing on a crucial issue that af-

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Wireless at the "Connected Games"

How the London 2012 Olympic and Paralympic Games will utilize the latest Wi-Fi Technology

Peter Leonhardt / BTDept. BT London 2012

BTLondon, England

peter.leonhardt@bt.com

I. INTRODUCTION

The London 2012 Olympic Games has been coined the "Connected Games", as never before have there been so many systems, user groups and individuals associated with the Olympics demanding network connectivity to each other and the wider world. BT as the official communications services partner to the London 2012 rolled out a national network to support the games, overlaid with different services for different requirements. Wi-Fi is just one such service, but a service which is very high profile in terms of being visible to how well it's performing due to the personal connectivity it provides, as well as being an ever growing area due to the increasing numbers of smart phones, tablets and the ever expanding content and services available online.

The paper examines the London 2012 Wi-Fi, looking at the requirements and the nature of the deployment including High Density Wi-Fi, and then examines its operation and how it performed.

II. THE REQUIREMENTS

The Wi-Fi requirements for the London 2012 Olympics are demanding and unique. The solution has got to be on a national level, providing a centralised Wi-Fi deployment to both sporting and non-sporting venues, 27 in total. The solution had to be able to scale up and scale down fast, as venues were built, used for a test event, or the real event, and then taken away, in some cases over a matter of days. The solution had to be secure, and centrally managed, monitored and operated from the London 2012 Technical Operations Centre. The Wi-Fi radio frequencies also had to be carefully planned with the London Organising Committee of the Olympic and Paralympic Games (LOCOG), to make sure different systems did not interfere with one another. This also included games systems such as for fencing and taekwondo which had Wireless transmitters operating in the Wi-Fi spectrum range built into the competitors clothing to relay hits back to the scoring system.

The solution also had to be reliable and resilient. All the venues were dual homed to **BT's resilient points of presence** dedicated for the games, and the wireless traffic once taken into the wired network via the access points on the venue where sent over this extensive backhaul network which linked all the venues together. Figure 1 shows just the sporting venues which were linked together, providing the backbone for the wireless network.

The solution also had to cater for multiple user groups

which are outlined in the below section.



Fig 1:Olympic Sporting Venues Networked together.

III. USER GROUPS

Public: The public increasingly want and expect Wi-Fi to be available for their general use to get to the internet, to have the ability to quickly upload photos and get to social media sites such as Facebook and twitter to share their experiences at the games.

LOCOG: LOCOG require a Wi-Fi service within the admin areas of venues, both sporting and non-sporting for general use. This service can also be purchased for use by the press, or other associated groups or individuals.

Machines (ticketing): A Wi-Fi service is required for the mobile ticket scanners which are operated by Ticket Master at the entrance areas

Athletes: As part of the general facilities for Athletes, a good Wi-Fi service is required to be available for them both within sporting venues and the Olympic Village

Mobile Data Offload: Samsung have partnered with the Olympic organisers and have produced an Olympic Family range of mobile phones which will be used by organisers and VIPs on the park and in venues. These OFMS (Olympic Family Mobile Service) phones require data offload via Wi-Fi when in designated areas.

IV. WI-FI DEPLOYMENT ACROSS THE OLYMPIC PARK

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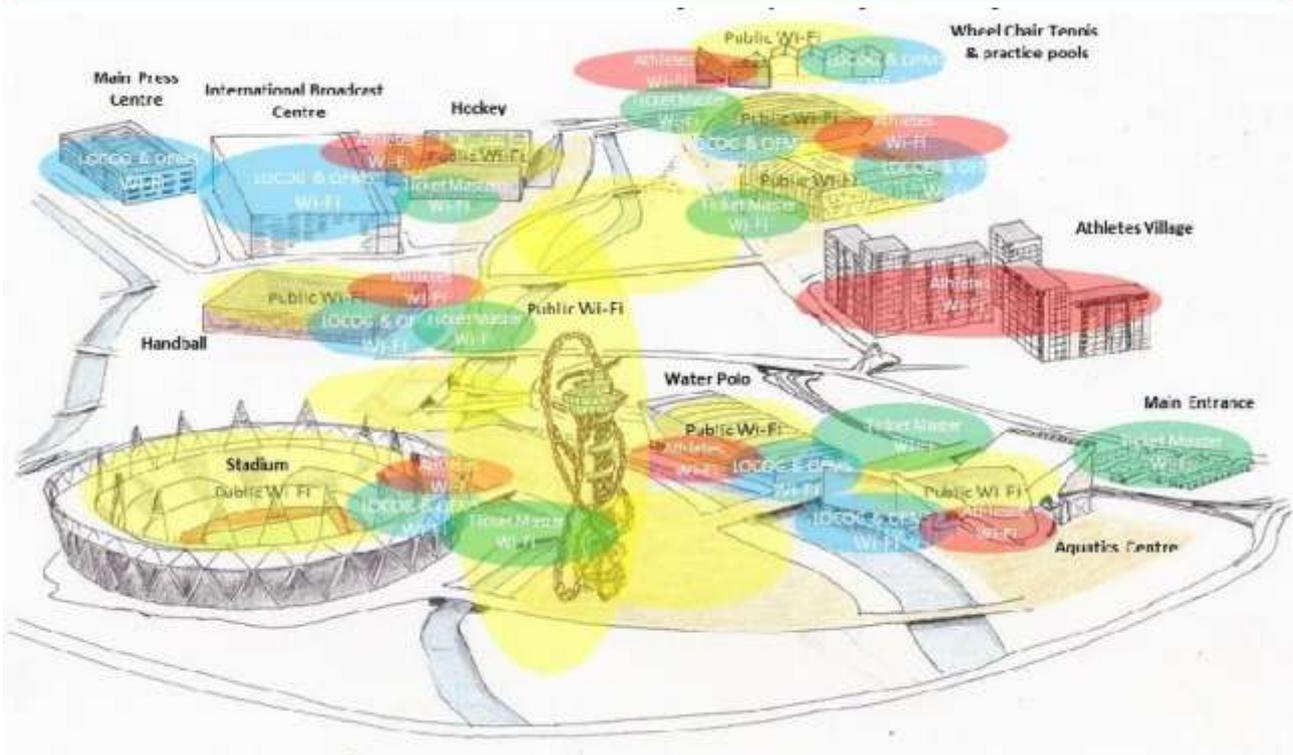


Fig 2: Wi-Fi resources distributed across the Olympic Park.

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The different user groups required different Wi-Fi set-ups depending on physical location and logical configuration. Broadly speaking, the Wi-Fi was split into Front of House services and Back of House services. Front of house services were in areas where the public would be to watch the games or were in transit, so these Wi-Fi services would include Public, OFMS, and Ticket Master. The back of house services were mainly for use in areas the public would not be, but athletes, organiser and press would, these Wi-Fi services included LOCOG, OFMS and Athlete's Wi-Fi.

The coverage areas across the venues were clearly dependent on where the user groups would require, or desire access to Wi-Fi, and therefore different areas had different wireless services rolled out. This applied to all venues, both on and off the park. The diagram below shows the main coverage areas specifically for the park so as to provide an overview of how the services were laid out in differing logical patterns, but all were sharing the same centralised physical infrastructure.

The most significant deployment in terms of differences in physical and logical configuration was the public Wi-Fi located in the seating bowls of the venues. This is High Density Wi-Fi, and will be explained in more detail in the following section.

V. HIGH DENSITY WI-FI

High Density Wi-Fi is a form of Wi-Fi deployment which is designed to provide good Wi-Fi coverage to groups of users in a densely packed group, for example, seating next to one another in a sports stadium.

Standard Wi-Fi deployments will fail to provide good service in such environments once there are significant numbers of Wi-Fi clients, as the access points and their associated radio channels will become congested by the volume of connections. Simply adding in more conventional access points into the environment will not necessarily make things better, as the radio footprint of additional access points will overlap with others and can in turn cause even more congestion.

The principle of High Density Wi-Fi (HD Wi-Fi) is that it is engineered to create lots of small radio footprints so as to be able to cater for pockets of clients in localised areas of the stadium. This means the radio traffic between the client and access point can be kept to lower volume and power, thus to avoiding the access point becoming swamped by too many clients and minimising radio interference from surrounding access points and their as-

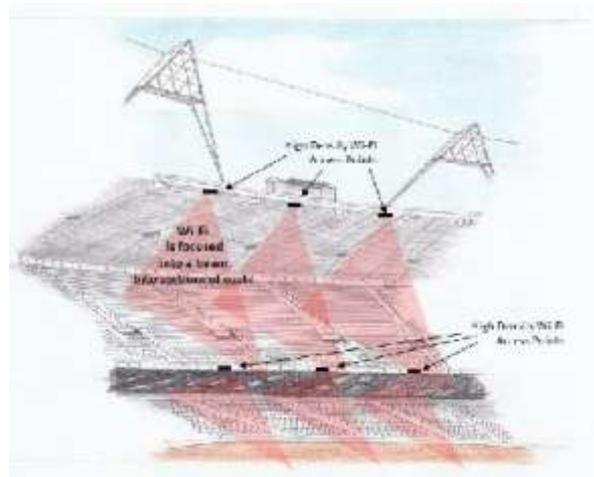


Fig 3: Wi-Fi coverage in seating areas.

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sociated client traffic.

Figure 3 below illustrates the way HD Wi-Fi is designed to cover seats in a stadium seating bowl.

There are four areas of physical and logical configuration detail which gives HD Wi-Fi access points their smaller radio footprint:

1: Antenna: A directional antenna is used to focus the radio waves from the AP onto a specific area, in a similar way the lens of a torch is used to focus light. For the 2012 deployment, the Cisco 3502P Access point combined with the Cisco AIR-ANT25137NP-R (Grayling) antenna was used. This can be seen in Fig 4 below.

2: Power: The power of the access point is reduced to a level where it can adequately cover its designated area, but not much further. This helps to avoid its signal over spilling into other access point's coverage areas.

3: Minimum Supported Data Rate: The further away the client, the less strong the signal, thus the lower the data rate which can be achieved by the client to the access point. Therefore the minimum supported data rate



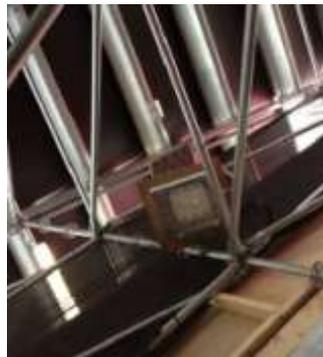
Fig 4. Cisco 3502P AP with Grayling Antenna

of the access point is raised to prevent clients which are further away, outside of the access points catchment area connecting.

4: Coverage Threshold: The minimum coverage threshold is reduced to make it more stringent, only allowing clients with a good Receive Signal Strength Indicator to connect to the access point. This helps keep clients local to the access point.

The small radio footprints means the access points must be designed and deployed carefully so as to avoid black spots but also not overlap too much with each other. In total, 176 HD Wi-Fi access points have been deployed in the seating bowl of the Olympic stadium. When mounting access points within the infrastructure of a venue, it is necessary to work with the features of the venue so as to find the best mounting

positions. In the case of the hockey stadium, there is no roof or over-hanging gantry, so the access points were mounted underneath the seats pointing upwards. A photo showing an access point in this deployment is shown below in Fig 5.



Once the access points have been positioned physically, and the antennas angled to cover the desired areas of seating or other high density area, then the solution is optimised via testing and then tuning of the configuration parameters above.

One of the challenges with the Public Wi-Fi in the seating bowl is how to test it, to accurately simulate a crowd of people for testing. The short answer is there is no precisely accurate way to simulate a crowd of people, due to the random nature of **user behaviours and different individual's technology**. So BT organised test events to create a controlled crowd of users, who could then be monitored and their experiences fed back for further optimisation. Rehearsals in the stadium also were taken advantage of for the testing and monitoring of the performance of the solution.

Once the install and optimisation is completed, it is then necessary to police and monitor the radio spectrum in the Wi-Fi space for sources of interference which could disrupt the service.

VI. POLICING OF THE WI-FI SPECTRUM

As Wi-Fi uses unlicensed radio spectrum in the 2.4Ghz and 5Ghz ranges, it is subject to all kinds of interference. This can come in the forms of other Wi-Fi access points, as well as many other non-Wi-Fi forms such as wireless cameras, Bluetooth devices, and also anything that can transmit radio waves as a side effect of their main job such as microwave ovens. In a distributed Wi-Fi network the scale and breadth of the Olympic Games, it is impossible to prevent all the sources of interference. However, it is important to pick up on the service affecting sources of interference, identify them quickly, and also have the political measures and planning in place to deal with them.

A good example of interference was during the Wi-Fi optimisation of the hockey stadium, it was noticed that the Wi-Fi access was being intermittently knocked out. Upon investigation the source of the interference was tracked down to a crane operating nearby. The crane had a wireless camera on its boom which relayed pictures using the 2.4Ghz spectrum to the a TV screen in the drivers cab. Every time the crane was operated, the signal was so powerful it knocked out the ability of the Wi-Fi in the hockey stadium to operate. In this example, once the source was identified, it was not a problem as the crane would only be there before games time. But it does show the importance of being able to pin down

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sources of disruption so as to be able to understand and highlight the cause, and asses and mitigate any impact it may have on service.

Early on in planning for the Olympics, it was necessary to work with LOCOG to understand what measures were being taken to regulate within the Olympic venues the radio spectrums, so as to be able to plan the successful deployment of Wi-Fi. With the large numbers of press, tv and broadcasting bodies descending on the park just before the games, there is huge scope for transmission equipment to disrupt the Wi-Fi services. Equipment of this kind therefore had to be approved by LOCOG for use, and plans on how to deal with sources of disruption formulated.

The BT Wi-Fi solution is monitored centrally from London 2012's Technical Operations Centre by BT, so any sources of disruption can be picked up pro-actively. A team on the ground with mobile spectrum analysers can then be dispatched to the location of the problem, and the exact cause can then be pinned down. How to deal with the cause depends on what it is, but the important thing is finding it so as to be able to rule out other technical problems for the service disruption.

VII. RESULTS – THE WI-FI IN OPERATION

The 2012 Wi-Fi performed well across all services during the games. The LOCOG service was used during the years and months running up to games, mainly from the organising offices for the general day to day build and preparation During the games, predictably the other services overtook the LOCOG Wi-Fi as most popular, with the Public BT Wi-Fi being the most utilised, followed by the athletes Wi-Fi. The Ticket Master Wi-Fi was built for consistent support for the mobile ticket scanners, which it provided throughout the games.

The pattern of utilisation is clearly shown below in Figure 6, with the athletes Wi-Fi client counts during the games, with the number of clients ramping up over the preceding days of the games, peaking during the middle, and then tailing off to the end. This pattern was reflected across all the services apart from Ticket Master which was consistent with the number of scanners throughout.



Fig 6. Client count for the Athlete's Wi-Fi Service

Out of the 2.4 Ghz and the 5Ghz Wi-Fi spectrum, the

2.4 Ghz was most heavily used. This is because the majority of handheld Wi-Fi devices only support 2.4Ghz, such as the iPhone. As a result, in areas of dense utilisation, the 2.4Ghz had slower speeds, where are the 5Ghz devices (such as iPads and the Samsung OFMS phones) had better performance as there was less congestion in the air.

The HD Wi-Fi performed as designed in the seating bowls of the venues it was installed, creating smaller Wi-Fi footprints, being able to deal with dense crowds better than conventional Wi-Fi.

The traffic patterns during popular events showed an interesting trend. It was originally thought that during popular events, upload traffic out the venue where the event was being held would be the most predominant traffic on the 2012 Wi-Fi solution, with people uploading pictures, messages and videos of the event to the internet. In reality however, the predominant traffic trend during a popular event such as the 100 Meter final was in the download direction. When the download traffic was drilled into, it was seen to be destined for other venues with people in, but not the venue where the

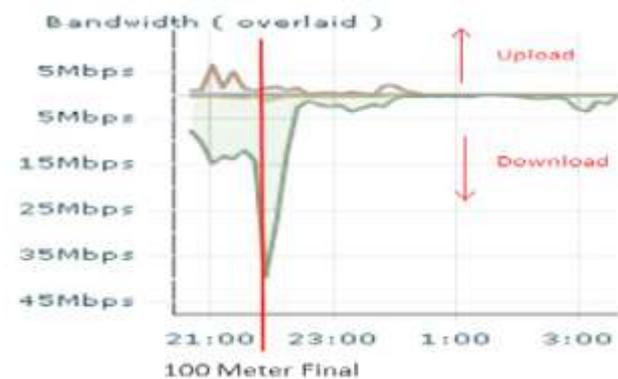


Fig 7. Wi-Fi download spike into the Basketball Arena during the 100Meters final.

popular event was being held. So in the case of the 100 Meter final, the traffic spike was in the basketball and handball arenas. Figure 7 below shows the traffic spike into the basketball arena when the 100 Meter final was being run in the stadium. The reason for this is that spectators in the other venues were streaming the live footage and results of the popular event to their mobile devices, taking a short break from watching the event they had tickets to, to not miss out on the big events happening nearby.

VIII. CONCLUSIONS

I) The extensive use of Wi-Fi at the London 2012 Olympics by multiple user groups shows that as would be expected, the demand for wireless communications is strong. This is driven by the growth in smart phones and tablets, and the ever growing availability of content, and interactive social media. It is therefore expected that this demand for wireless connectivity and bandwidth will continue to grow and be demanded at other such events which draw people together.

II) In order for a Wi-Fi deployment on this scale and with such diversity to be successfully deployed, including

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HD Wi-Fi, the strategy should follow the below sequence:

1- Design: This includes site surveys to identify the best positions for access points, and the backhaul infrastructure.

2- Build & Deployment: The backhaul infrastructure should be built first, and then the access points should be commissioned last.

3 – Optimisation & Testing: This is an especially critical phase for HD Wi-Fi. During optimisation the parameters outlined in section V are tuned so as create the optimum Wi-Fi cell sizes, with the best physical locations and angles of the antennas tweaked and adjusted as necessary. Continual testing is required to make sure and confirm what effects the changes are having in the overall performance of the Wi-Fi. Test events should be conducted to see how the Wi-Fi performs in realistic crowded situations.

4 – Policing and Monitoring: After optimisation and testing has settled on the set-up of the Wi-Fi solution, then it needs to be policed. This means the radio spectrum needs to be monitored for sources of interference to the Wi-Fi, and if appropriate, acted upon. What is acted upon depends on what has been agreed with the organisers (LOCOG in the case of London 2012), but the main thing is being able to pin down any radio interference issues to their cause, so appropriate action if required is an option.

iii) In areas congested with Wi-Fi clients, devices which operated within the 5Ghz channels performed better. This is due to less congestion, as less device types operate on 5Ghz frequencies, and there are more channels available in this spectrum range. As time passes however, it is expected more devices will support 5Ghz, so this advantage they have at the moment will diminish with the growth in 5Ghz devices.

iv) Wi-Fi traffic patterns observed during the most popular Olympic events reveal that the most noticeable trend was downloads to the venues where people were present, but the popular event was not taking place. This was due to people streaming live video of the event taking place elsewhere to their mobile devices. This is probably a phenomenon unique to the Olympics, or other such multi venue sporting events.

v) Conventional Wi-Fi using a normal omnidirectional antenna does not operate effectively in areas with dense numbers of clients such as the stadium seating bowl. High Density Wi-Fi provides a better service by providing smaller but more frequent wireless cell sizes thus cutting back on the volume of clients associated to an AP, keeping the traffic local and minimising congestion.

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of the birth of Alan Turing, one of the founding fathers of computing.

All of these notable anniversaries were recognised and celebrated during a one day seminar on the 24th September 2012, at Savoy Place in London, organised jointly by the Institute of Engineering & Technology (IET), previously the IEE, and the Institute of Telecommunications Professionals (ITP), the parent body of FITCE UK. The event was attended by some 250 people – noteworthy for the fact that the event was oversubscribed within days of advertising!

The day comprised as series of presentations and discussions. Video recordings of all of the presentations, as listed below, are available via: www.theiet.org/175-years

- Telegraphy and Telephony, 1837 –1912 by John Liffen, British Science Museum
- The dawn of the digital age by David Robertson, science & technology journalist
- The transmission network by Prof Keith Ward, University College London
- Circuit switching evolution to 2012 by Prof Andy Valdar, University College London
- Radio communications in the UK – emergence and evolution by Robert Martin-Royle, Chairman of the History of Technology Committee, IET
- Satellite communications: from Telstar to Eternity by Des Prouse, retired
- History of mobile communications by Steven Hearnden, Director: Information and Communications Technology Transfer Network.
- From packet switching to cloud, by Prof Nigel Linge, University of Salford

The ITP journal has issued a special edition with articles covering each of the presentations above (Vol 6, Part 4, 2012)

Prof Andy Valdar.

FITCE UK.

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fects us all in today's Digital Age, namely how do we ensure that our information is secure and safe when using computers, smartphones, tablets, etc. The title of 2013 Congress is "Moving towards Trustworthy Digital Ecosystems". It will be held in Leuven (Belgium) from the 4th to 7th September and is jointly organised by FITCE, the University of Leuven, and a number of cyber-security partners.

The objective of this congress is to provide an overview of national, European and global cyber security strategies, the security impact on applications (e.g. those used on smartphones), ICT architectures and enterprises, via keynote presentations and tutorials, in addition to submitted presentations. This will provide a platform which will enable experts and non-experts to gain valuable insights. As you see, we will all be experiencing a new model for the FITCE Congress, which focuses on a specific subject and is run in cooperation with a number of partners.

The FITCE Marketing Working Group is using the opportunity of this new Congress format to assess the future positioning of our most valuable asset. In the last six months we have been concentrating on translating our proposed FITCE growth strategy into a number of actions, covering membership development, organization and process, communications, web presence, service to members, partnerships and liaisons, and (of course) Congresses. Our aim is to foster innovation to ensure that FITCE is able to adapt and rise to the challenges coming from a world of ICT changing at an ever increasing pace.

Success for our federation depends on everyone's willingness to embrace innovation, by supporting and adapting to the changes we will be proposing.

So why do not you join in this work, by being part of our regular online discussions and live meetings? We will be glad to meet you at our congress in Leuven and exchange views on how we can improve the added value of our organisation to his members. Please distribute the congress programme to as many organisations who you feel will be **interested in your country**. **We are sure that this year's ambitious FITCE congress will give a much-needed boost to our brand name**, thus helping us become more widely recognized and more focussed on the innovation goals which will make our vision of a better future through technology a reality for everyone.

See you in Leuven, then!

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FITCE Forum

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FITCE Values and Aims

1. Keeping in touch with leading edge ICT developments.
2. Ensuring that our Members benefit from the experience acquired by other Members in all ICT fields.
3. Building strong cultural and business ties between European ICT Professionals.
4. Ensuring that Young Professionals are able to use FITCE as a valued resource in their career development.

FITCE Mission and Vision.

We believe in an evolved society where ICT professionals play a **fundamental role to make the connected digital world a reality**".

Our mission is to act as a platform for networking and knowledge exchange between ICT & media professionals. Our aim is to leverage the innovation potential of ICT to improve the life for individuals and the efficiency of business, thus enhancing our society as a whole.