
60 years
of
FITCE
1961 to 2021

# List of FITCE Presidents

| NAME | COUNTRY | ELECTION (date and location) |
|---|---|---|
| WOLF Jean | Luxembourg | 1962 Brussels |
| VERHAGE Gerard | Netherlands | 1963 Roma |
| KIRCHNER Otto | Germany | 1965 Den Haag |
| LAMBIOTTE Marc | Belgium | 1966 Frankfurt |
| BOUTONNET Charles | France | 1968 Luxembourg |
| RUSSO Cecilia | Italy | 1970 Venezia |
| BERNARD Leon | Luxembourg | 1972 Stuttgart |
| VAN BEKKUM Jan | Netherlands | 1974 Luxembourg |
| HUFNAGEL Werner | Germany | 1976 Firenze |
| HULEUX Emile | Belgium | 1978 Berlin |
| CABANNE André | France | 1980 Liège |
| CONDON Gerry | Ireland | 1982 Bordeaux |
| BENEDETTI Marino | Italy | 1984 Roma |
| DONDELINGER | Luxembourg | 1986 Gravenhage |
| HAMELBERG Peter | Netherlands | 1988 Cork |
| SHURROCK Colin | United Kingdom | 1990 Glasgow |
| KOUREMENOS Dimitri | Greece | 1992 Granada |
| ROJO SERRANO Jose Luis | Spain | 1994 Dresden |
| GOMES DE AZEVEDO Antonio | Portugal | 1996 Vienna |
| KRAUS Guntram | Germany | 1997 Thessaloniki |
| MARUSZCZAK Stefan | Austria | 1999 Utrecht |
| VAN OOTEGHEM José | Belgium | 2001 Barcelona |
| GONZALES MATEOS Carlos | Spain | 2003 Berlin |
| ARGYROPOULOS Georgios | Greece | 2005 Athens |
| REYNOLDS Barry | Ireland | 2007 Warsaw |
| PENZA Andrea | Italy | 2009 London |
| GERRESE Jos | Netherlands | 2011 Palermo |
| HALKA Wojciech | Poland | 2013 Leuven |
| VALDAR Andy | United Kingdom | 2015 Wroclaw |
| RUGEL Stefan | Germany | 2018 Salford |
| MIEDL Alois | Austria | 2020 Krakow (virtual event) |

# The Forum for European ICT and Media Professionals

Registered in Brussels: www.fitce.org

**Dear FITCE friends,**

It is very impressive how long 60 years is and how much has changed in the field of telecommunications over the last six decades. The purely national telecom operators grew into international ICT groups. The industry has globalized and communication devices that were only known from TV series Star Trek and its Star Ship Enterprise back then are now ubiquitous.

In 1961, the CEOs of telecommunications operators – Belgium, Luxembourg and France – recognized that collaboration and sharing of experience among senior engineers was critical in an ever-changing telecommunications world. Within a year, FITCE was born, an international, non-profit association with national federations from Belgium, Luxembourg, France, the Netherlands, Germany and Italy. By 1981, Ireland, the United Kingdom, Spain and Greece had joined FITCE as members. Over the next decades, another six national associations from Portugal, Austria, the Czech Republic, Poland, Bulgaria and Romania joined.

The strong competition in the telecom industry, the internationalisation, and the dynamics and breadth of technology topics have also changed FITCE a lot, but our goals have remained the same: To promote knowledge and experience sharing across your member associations, while also traditionally placing a high value on social activities.

Many thanks to Andy Valdar for creating this time travel through 60 years of the telecommunications industry and FITCE.

Enjoy reading the time travel.

**Alois Miedl**
**President of FITCE**

***"In my opinion it is excellent that FITCE continues to offer contacts and experiences in different subjects of interest. All the best for the FITCE Congress."*** **Werner Hufnagel, President of FITCE, 1976 – 1978**

# How FITCE Congresses have reflected the developments in the European telecommunications industry over the last 60 years

**The Beginning**

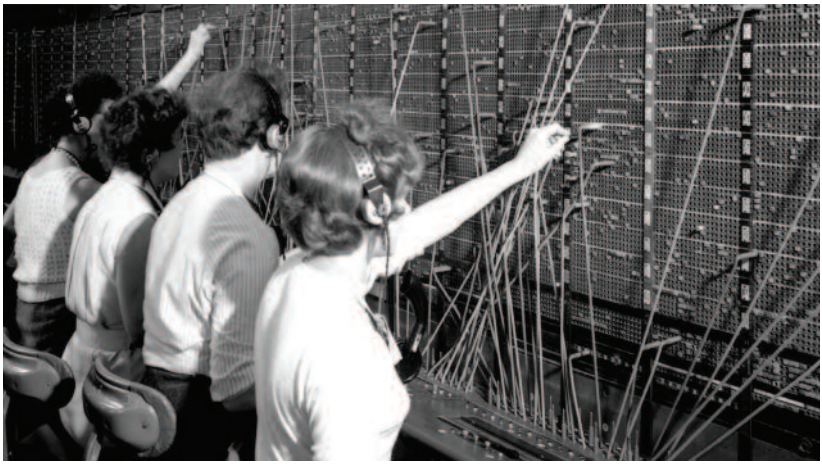
The European telecoms world was a very different place 60 years ago when FITCE started. There were no mobile phones, no Internet, and no personal computers, tablets, or laptops – in fact there were not even electronic calculators: engineers normally used slide rules or logarithm tables to make calculations. The expensive and scarce computers were only assessable through 'batch processing' in which users had to prepare program and data on paper tape or punched cards, leave at reception of the computer centre and collect the result the next day! Also, all electronics equipment comprised discrete components (resistors, capacitors, valves, transistors, etc) since integrated semiconductor circuitry (chips) had yet to be developed.

Telecommunication services for business and residential customers were predominantly telephony, carried either over the public switched telephone network (PSTN) or over leased lines between business premises. At this time each country had a single monopoly telecoms operator, usually fully owned by the government. This monopoly also extended to the customer apparatus: all network attachments were provided on lease by the operators. However, most importantly this monopoly regime was in the context of a thriving European telecoms manufacturing industry, supplying most of the operators' needs – e.g. Alcatel in France, ATT/Phillips in the Netherlands, Bell Telephone and Atea in Belgium, Ericsson in Sweden, Marconi in Italy, Siemens in Germany, GEC, STC, and Plessey in the UK.

Considering the stark contrast of that period to today's data-centric, multi-player, multi-media competitive telecoms industry, it is remarkable that FITCE has been able to encompass the enormous changes over its lifetime. The following summarises how the FITCE annual congresses tracked these changes.

**The 1960s**

At the start of this decade the PSTN was based on electro-magnetic step-by-step automatic exchanges (e.g. strowger and rotary) covering local and trunk exchanges, although there were still many areas served by manual exchanges. Manual exchanges were also used to handle long-distance and international calls, many of which still had to be booked in advance. However, from the mid-60's semi-electronic systems – e.g. crossbar and reed relay – with their centralised control (often



In the '60s, many areas were still served by manual switchboards.

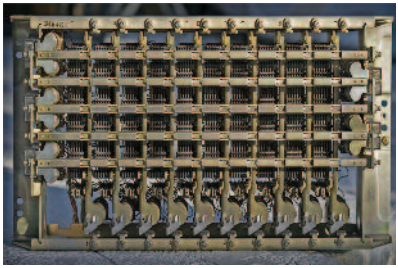
hybrid relay-electronic) were replacing these systems, offering significant savings in maintenance costs for the operators. After some trialling with PAM exchange systems all future developments of electronic exchanges across Europe were based on the emerging PCM digital technology.

The Telex network, which had been established since the 1930's separately from the PSTN (although using the same metallic access network) throughout Europe, was also converted to automatic switching using. strowger or rotary systems. This telegraph-type service, between teleprinters located mainly in offices and factories, provided businesses with legally verifiable messages thanks to the identification handshaking at set-up and clear down of connections. The later introduction of international Telex established a vital means of business communications around the World.

Transmission in the access network was also analogue, based on metallic (mainly copper) pairs. Links between exchanges were mainly analogue coaxial cable and microwave radio, although the emerging 24 channel digital PCM transmission systems were beginning to be deployed.

Later in the 1960s 'Datel' – data over telephone – carried over the PSTN as a telephone call emerged. Also, there were a few small experimental networks for data using dedicated circuit switches or X25 packet switches, used mainly by universities and other research institutes. Finally, it is worth noting that the first TV and telephony satellite – Telstar – was launched in 1962 (Telstar 2 in 1963). [The Eurovision organisation had already been established in the early 1950's as a means of sharing TV programmes over telecoms networks across Europe.]

All these developments were posing



The mid-60s saw semi-electronic systems emerge. Pictured: a crossbar switch matrix (left) and a traditional dial telephone.

many deployment challenges for Europe's operators, and the FITCE annual congresses soon establish themselves as effective venues for the sharing of experiences. The congresses were typically achieving over 500 delegates, with active sponsoring participation from the European manufactures, as well as all the network operators serving the FITCE National Associations. A glance at the list of congresses in Appendix One shows that they lasted six days, usually with a full day mid-week allocated to technical visits to the local manufacturer's and operator's facilities. The high-level of sponsorship and large delegate and partner attendance led to largescale social events most evenings and lunch times, establishing the social programme as an important attribute of the congresses.

**1970s**

In the early part of the 1970s the last remnants of manual telephony switching were eliminated due to the wide-scale deployment of direct long-distance dialling – leaving the manual facilities for emergency calls and service assistance, and international calls until direct dialling was fully introduced.

This automation, together with increasing levels of semi-conductor electronics in the exchange call-control systems, led to increasing operational cost savings. The inclusion of computer-technology into telecoms switching, signalling and control equipment gained a big stimulus with the launch of the Intel 8080 (8-bit microprocessor chip) in 1974. It was around this time that Europe was adopting the CEPT 30ch standard for digital PCM transmission within its networks (leading to replacements of the earlier 24ch systems). By the end of the 1970s the groundwork was already established for introducing digital PCM into all inter-exchange transmission systems and later the telephone switching systems. In the access network residential and small-business telephony was still being carried over metallic pairs, although there was increasing deployment of coaxial analogue cables for telephony and leased lines for large-business premises. Most countries now had two analogue long-distant transmission infrastructures – coaxial cable and (4 or 6GHz) microwave radio using a network of tall radio towers. Both these transmission media carried the standard 4MHz analogue FDM (960 telephone

circuits or one TV channel) systems; also, higher capacity 12MHz FDM systems were used on major cable routes.

The FITCE congresses during this decade allocated half or whole days to each of the main technical challenges facing the operators. Typical areas of interest were the economic deployment of FDM analogue long-distance transmission systems, as well as the roll-out of the 30ch PCM digital systems. Already TV transmission nationally and internationally was becoming an important new service in addition to telephony. The increasing use of transistors in transmission amplifiers and telephone exchanges meant that the network operators across Europe were keen to further modernise their network.

1980s: A Minitel home terminal (top) and Alcatel's System 12 (above).

**1980s**

This was the 'decade of digital' for Europe – in the form of the European standard (later International CCITT standard) 2Mbit/s TDM PCM 30ch module – being deployed in networks for inter-exchange transmission and telephone switching. After its early appearance a few years earlier, optical fibre cable was beginning to replace the long-distance and access coaxial cables. Towards to end of the 1980s the multi-mode optical fibre systems were replaced by single mode fibre supporting 140 Mbit/s PDH systems to carry telephone, leased lines, and TV services.

On the telephone switching side, most of the big telecom manufacturers started to develop digital all-electronic exchanges, using TDM switchblocks with computer processor call control. The new concept of 'integrated digital networks (IDN)' was achieved when the deployment of digital transmission links was focused on connecting directly at 2Mbit/s onto the digital exchange switchblocks. In addition, the advanced digital inter-processor messaging system (CCITT SS7) was introduced for inter-exchange signalling – essentially a dedicated packet routeing facility. Several digital exchange systems were developed and subsequently progressively replaced the analogue exchanges across Europe, e.g: Alcatel's System 12, Ericsson's AXE10, GPT's System X, Phillips/ATT's PRX, and

In 1984 legislation was passed to privatise British Telecom.

Siemen's EWSD. During the period parallel development was taking place in the Telex exchanges, which were converted to SPC (i.e. centralised computer control).

In addition to the big shifts towards TDM digital technology in the telecom. networks, there were the early signs of huge shifts in the regulatory and commercial ecosystem. In 1981 competition was allowed in network service and users' attachments within the UK, and in 1984 the UK Government passed ground-breaking legislation to privatise British Telecom. It also established a new regulator, Oftel, who applied consumer price control to ensure that the newly private British Telecom did not exploit its monopoly position, as well as encouraging competing entrants into a widening range of ICT markets.

Subsequently, these changes of regime gradually spread to all the European countries.

The 1980s also witnessed the birth of the cellular mobile networks across Europe. However, the first-generation cell phones were entirely telephony, with analogue radio transmission (although TDM digitally switched at the mobile exchanges) and were bulky and heavy compared to today's handsets. The relatively high price for mobile calls at the time meant usage was mainly by business customers.

The development of computing hardware and software began to take off early in the 1980s, with the introduction of desk-top computing into offices using the new IBM PC or derivatives, creating demand for public network data services. Small-scale packet switching

Image courtesy of Wiffy at English Wikipedia

Tandata Td1400 Prestel terminal *(supplied by the Nottingham Building Society for its home banking service).*

(X75 standard) was implemented, first on a national then international basis across Europe. In the UK, in response the stimulus of competition from the new competitor Mercury, BT introduced two data digital leased-line services. Finally, ISDN initially standardised in 1988 (CCITT Red Book) enabled operators to provide a digital local line over the normal pair access network terminating on the TDM digital exchanges, enabling a digital path (IDN) end-to-end between subscribers. Although circuit switched as a telephone call, this did pave the way for early adoption of digital data networking for business and residential sites. Towards the end of the decade the use of fax machines attached via modems to standard telephone lines rapidly became popular as a way of transmitting scanned full pages of text or diagrams – leading to the decline in demand for Telex service.

To complete the overview of non-voice information systems various 'teletext' services were deployed across Europe. These services used special text terminals on user's premises sending and receiving information via modem over the local telephone lines to computer servers usually run by the PSTN operators, with links to various information providers. In the UK, Prestel used a set-top box with TV sets, while in France the Minitel (télètel service) used terminals with text screens and keyboard provided free by the operator. The original driver for the Minitel was to cut directory-enquiry costs by giving subscribers access to all directories, but it later also became a popular mechanism for making purchases, booking tickets, etc – so, essentially becoming a forerunner of the world-wide web! Minitel-type systems were subsequently introduced across Europe (e.g. Belgium, Finland, Germany, Ireland, Italy, the Netherlands, Spain, and Sweden,) All these services were withdrawn some 20 to 30 years later.

So, in hindsight, we can see that the developments in the 1980s were indeed profound and formed the foundations for the complex telecom environment we have today.

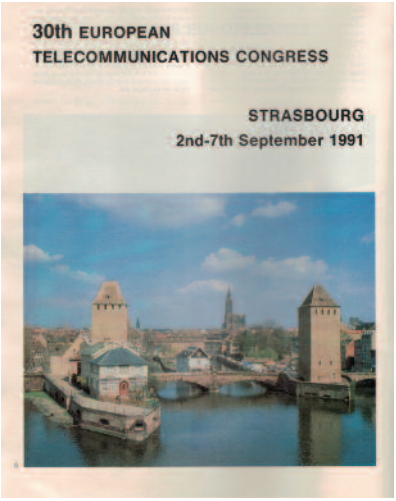
The FITCE congresses provided a much-needed forum for the sharing of knowledge and experience between operators, manufacturers, and industry consultants across Europe – addressing

the issues of digitalisation of the switching and transmission networks, the introduction of cellular mobile networks, early data networking, and the emergence of competition and regulation within the industry. The 6-day congresses continued to be on a large scale, with up to 500 delegates. In addition, FITCE introduced a new endeavour – namely a European-wide study commission. The remit of the team drawn from several National Associations was to study over two years the operators' challenges of local line plant provision, covering such issues as forecasting capacity, optimum cable sizes, use of pair-gain systems, etc. The commission presented on progress to the FITCE Congresses and published a final report for use by the NAs.

**1990s**

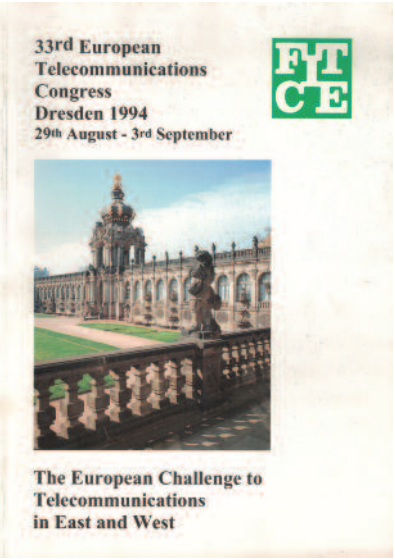
Undoubtedly, the two major breakthroughs of this decade were the introduction of GSM and the public Internet with World-Wide Web.

During the 1980s work at CEPT and ESTSI established the European standard for the 2nd generation mobile system (known as 'GSM'), designed as an encrypted digital system allowing full roaming. It was originally expected that it would be adopted by just 18 European countries following the 1992 launch. However, its clear success was widely envied, and it was eventually adopted in 219 countries across the World! Although primarily for voice calls, it did have a small data capacity. But most importantly it provided the new service of text messaging via the




GSM network (which against all predictions soon grew to be the dominant revenue earner for mobile network operators). GSM was also the system that introduced the sim card, decoupling handsets from the service subscription.

In 1991 the largely experimental ARPAnet, which had proved the efficacy of TCP/IP, became the now familiar Internet. The all-important inclusion of the World-Wide Web facility enabled software browsers to access content on remote servers. A new entity emerged, that of the Internet service provider (ISP) – initially undertaken solely by the incumbent telecom operator – providing the gateways from the telecom networks to the Internet. Although at first it was used mainly by businesses customers the Internet's popularity grew rapidly among residential customers once cheap PCs with graphical user-interfaces





Sky One's 1990s success story included The Simpsons .

became widely available and there was sufficient useful content to access. This led to growing demand for telecom operators to provide web-access services for residential customers, which initially was provided using modems on the telephone lines and dial-up service via the PSTN.

It was into this febrile atmosphere of rapidly expanding GSM and Internet usage that the new concept of public cable TV networks emerged. Initially designed for TV distribution by deploying local hybrid-fibre-coaxial cable to customers premises, they soon became upgraded with a data modem capability providing an alternative means of Internet access for homes. In some countries the cable TV operators were also allowed to provide telephony service in competition with the incumbent operators. In addition, the Sky broadcast TV satellite subscription service was launched in Europe during the 1990s, offering live sport, films, as well as new content, competing with the established free-to-air TV broadcasters.

The commercial benefits of these new technologies attracted significant investment, particularly from new entrants, keen to exploit new markets. Whilst this stimulus produced consumer benefit – e.g. falling prices, product innovation and improved customer service, the resulting over-heating of the markets sowed the seeds of a spectacular crash, as described later in this article.

Throughout this decade roll out of the TDM digital telephone exchanges continued extensively, with the subsequent withdrawal of the old analogue exchanges. ISDN service take-

FITCE 1995, in Bologna, Italy, focussed on Telecommunications Management.

up increased rapidly, particularly with the advent of digital PABXs used on business premised linked to the serving public exchange by primary-rate ISDN at 2Mbit/s giving 30ch telephone channel capacity.

Although first developed a few years earlier, the new international digital transmission standard of synchronous digital hierarchy (SDH) was deployed on a large scale throughout the 1990s, progressively replacing the earlier PDH systems. Operators benefited from the simpler configurations and new operations management facilities. In addition, capacity of the long-distance optical fibre routes was further increased by introduction of WDM.

The 90's decade also was a period of huge change politically and economically for those European countries that had been in the Soviet-Union controlled Eastern Bloc. From the end of 1989 the "Iron curtain" began to collapse across Eastern Europe, followed by the re-unification of Germany in October 1990, and the dissolution of the Soviet Union in 1991.

As this part of Europe opened, the wide disparity in the telecom networks became clear. The infrastructure was poorly developed, with few telephones and a PSTN based on analogue electro-mechanical switches. Most long-distance and international calls were still manually switched, partly to ensure that calls to other countries could be monitored by the authorities. The copper subscriber lines were in a poor condition and many were used on a shared basis across several households. There was minimal data networking, although leased lines and microwave links did exist. As the 90's progressed many players from Western Europe and elsewhere invested heavily in modernising the networks, deploying modern infrastructure for mobile and fixed networks. The resulting new networks used the latest technology, inevitably over-taking the established Western European countries in many areas.

The FITCE congresses continued to provide the forum for sharing of experiences and plans between the European network operators – the

effects of competition had not at this stage begun to inhibit such sharing. However, the explosion of services and technologies of the 90's created a huge range of subjects to cover during the congresses technical presentation sessions. Therefore, FITCE defined themes for the congresses to focus the call for papers, as well as giving an identity to each congress which could generate interest among sponsors and potential delegates (see Appendix One). Examples of the issues addressed by technical sessions include network modernisation, new services and customer needs, pan-European aspects, regulation, ISDN, the rise of multi-media, and network operations and management. In 1991 the second 2-year FITCE Study Commission was established entitled "The study of network performance considering customer requirements". The outcome from this commission fed into ETSI's on-going QoS work and then formed the basis of ITU-T Rec G 1000 issued 2001, giving FITCE a high-profile role.

**2000s**

The early years of the new millennium saw the famous crash of the "dot.com" bubble on the stock markets around the World, in which by 2002 the value of many companies exploiting the Internet-based business had significantly dropped. After the over-hyping of such companies earlier there was a huge decrease in business and data traffic. With the resulting over-capacity on most major cable routes demand for purchasing of new telecoms and data equipment significantly dropped also. Many of the new telecoms and data

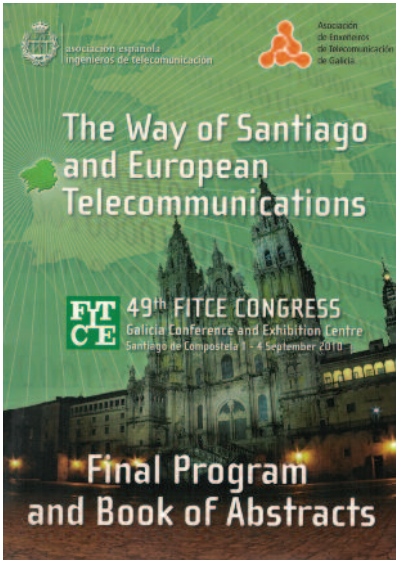
The early 2000s heralded the dot.com crash.

operators ceased trading, while the manufacturers were severely weakened, either reducing size or merging with others. Ironically, it was the companies able to meet the needs of the enterprise market (data LANs and campus/factory-based telecoms) that drove the recovery, leading to the rapid rise of IP router and Ethernet manufacturers. However, it took a long time for European telecom manufacturers to recover.

Once the dot.com crash passed, the decade heralded the rise of data and web access over mobile phones. Towards the end of the 1990s the widespread GSM networks across Europe were enhanced by an overlay of GPRS nodes (classed as 2?G) allowing packet switching of data sessions and access to the www using a WAP browser. Then the next generation of cell phones – 3G – greatly enhanced the data speeds and ease of web access. The European governments awarded 3G licences to new and incumbent operators, often via an auction process. In 1999 the Blackberry provided the first keyboard enabled mobile email phone (and limited web access), which was soon adopted by the

business community. Then in 2007 Apple's revolutionary iPhone hit the market – introducing the concept of "smartphone" and downloadable applications ("Apps") which caused an explosion of mobile data traffic. This, and subsequent devices, all had touch screens, virtual keypads, and easy web, email, and text access – and also incorporated the functions of PDA (calendar/diary, address book and notepad), camera, mp3 player, etc.

Meanwhile, the amount of data generated by customers continued to grow rapidly, thanks to the rollout of various broadband digital technologies – ADSL over the telephony metallic pairs for residential customers and the increasing use of optical fibre and microwave point-to-point radio for business premises. There was continuing customer pressure for higher




bandwidths, but also a reluctance to pay more, which the fixed operators had to satisfy. It was during this time that WiFi routers started being used within domestic premises as well as public areas such as coffee shops and airports, enabling several users in a location to access a fixed broadband link. It is interesting to note that the rapidly growing national volume of data traffic on the fixed networks overtook the total TDM digital voice call traffic around 2005. It would be a further five to six years before the same cross-over occurred for mobile networks.

Although since the mid-1990s voice-over-the Internet systems aimed at the business market had emerged, it wasn't until Skype started in 2003 that easily managed VoIP service was available. Initially skype, based in Estonia with HQ in Luxembourg, was voice call only but later provided a video facility. Even though it was 'free' the quality was variable, and traffic lost to the Telecom network operators was tiny. It was another ten years or so before Europe's mobile operators allowed the Skype app. on their phones.

The content of the FITCE congresses during the 2000s reflected the era of massive changes to the telecoms industry that were becoming apparent – the potential of data services on mobile, the rise of new players using enterprise data equipment to challenge the traditional networks of the telecoms operators, and the impact of network service competition from within Europe and globally. This pressure on the telecom manufacturers and operators led

to demand for shorter congresses (see Appendix One), reduced availability of sponsorship, and led to a drop in delegate numbers.

**Since 2010**

The ICT ecosystem that we are familiar with today really began to be established from 2010 onward. Primarily driving this was the rapid adoption by consumers of smart user devices with ever-increasing computing power – smartphones, tablets, PCs, laptops, and more recently smart TVs and sound systems. Added to this, increases in numbers of websites, 24-hour on-line shopping, social networking, streaming, and downloading drove the growth in data usage by residential customers. The majority of this was carried via residential Wi-Fi over fixed broadband links, the remainder over mobile networks.

Fixed broadband links were progressively upgraded to give ever-higher upload and download data rates – using VDSL, Gfast, fibre/copper hybrid lines, and PON, Ethernet, or point-to-point fibre-to-the-home systems.

From around 2012 rollout of 4G mobile (LTE), with its greater data capability, started across Europe. Although the standard has an all-IP architecture, telephone calls on early versions had to be passed to the existing 2G/3G digital TDM exchanges (known as "circuit-switch fall-back") because there was no provision for call control. However, towards the end of 2010 control systems such as IMS started to be installed, providing full telephony, known as VoLTE.


There were several consequences of the 'data wave' sweeping Europe. Firstly, cyber security became ever more important, particularly in homes. The advent of the 'Internet of Things' (IoT) greatly expanded the potential cyber-security weak spots in in domestic and business premises. Secondly, there was a rapid emergence of new well-financed players in the telecoms market (e.g. Amazon web services, and Google networks). Their provision of huge capacity networks and servers helped the establishment of a range of cloud services. The Telco's also moved into these new markets. A particularly interesting area to emerge during this time was that of 'smart cities' – the merging of IoT, smart phone applications, etc., and structural changes to the way civic services (e.g. public parking, buses, trains, and domestic waste collection) are managed.

Video traffic and streaming have soared, notably during the pandemic.

Following the example of Skype, the market for on-line video meetings also grew at this time, with platforms such as GoToMeetings, and – boosted by Covid forcing workers to work from home and isolated families to communicate on line – with recent emergence of Teams and Zoom. In addition to this video traffic, the telecoms networks had to cope with the streaming of TV programmes and (90 to 120 minutes plus) films from new platforms like Netflix, BBC i-Player, etc. However, many of the Telco's have tackled the competition from the various video providers by providing their own IPTV services and indeed becoming media players in their own right.

However, it was from around 2015 that Europe's network operators embarked on their biggest transition programmes. Despite the pronounced shift to IP platforms for handling the data traffic over the previous years, the operators still had their circuit-switched digital PSTNs to handle the telephone calls on the fixed network. This 20 to 30year-old equipment was becoming obsolescent and not supported by the manufacturers, although generally working well. Given the emergence of 'carrier-grade' data networking equipment around this time, the operators began building VoIP/ IMS/SIP platforms onto which customers' fixed lines are transferred, with a view to closing the PSTNs. Target dates differ among the operators: e.g. Jersey completed in 2018, Germany completed around 2020, the UK target is 2025 and France is aiming for 2030. Importantly for the operators, the large-scale deployment of optical fibre in the customer-access network (using VDSL, Gfast or FTTH and GPON) allows a restructuring of the transmission in the local access network, freeing up many of the old exchange buildings – the sale of which provides useful financing for the PSTN replacement.

On the mobile network front, the new 5G system started rolling out around 2019. These networks are initially just in the form of new high-speed cell sites, with

traffic passed to the existing 4G core network. Later in the 2020's new 5G core networks will be installed, and operators will start to withdraw the legacy 2G and 3G networks. The 5G system will not only offer higher user-data speeds, but also the capability to handle hugely increased numbers of user terminals, supporting IoT and many new applications. Differential QoS for the multi-service 5G network will be manged by the new concept of 'network slicing', together with exploitation of NFV and cloud networking. A new arrival on the broadband scene is that of compact LEO satellite constellations (e.g. from SpaceX and OneWeb) which will be offering competing coverage over Europe shortly. We can also expect that the future widescale deployment of IoT – networks of connected low-power devices – in the home as well as industrial premises will make a profound impact on our daily lives.

It is important at this point to consider the impact of these technical developments on the behaviour of today's society, customer expectations, and the new commercial structures. Probably the foremost change for society was the introduction of mobile service – making the telephone number relate to a person, wherever they are, and not a single location as with the PSTN lines. This has meant that people are directly accessed any time of day or night. The next profound change is that of the wide-spread adoption of the e-commerce offered by the web, with its 24hour shopping, etc., causing disintermediation of many existing business and closure of 'legacy' businesses. Finally, there is a pronounced shift in the way people now communicate, with the preference for (asynchronous) messaging rather than the traditional two-way (synchronous) voice calls. Whilst these changes have driven demand for web access service, the telecoms operators have been profoundly damaged by the rise of new players providing services over the web (known as "over the top") which target their value add. For example, subscription platforms like Netflix providing films and other video content – which affect not only broadcast TV providers but also drives the subscriber demand for bandwidth. Unfortunately, customers do not expect to pay extra for higher speeds and indeed have come to accept free application services such as You Tube, Zoom, Skype, WhatsApp, etc. and the many on-line social networks, to be the norm. Of course, so-called 'free services' are actually financed by the platform-owners selling their customers' personal usage and preference data to on-line advertisers.

The FITCE congresses since 2010 have address the huge ICT explosion, covering smart cities, bridging the ICT digital divide, the ubiquity of IP platforms, and the way digital (especially video) is now dominating the telecoms networks. Although, the numbers of delegates have reduced over the last few years, the focus of the technical sessions has enabled useful debate and understanding of the profound changes affecting telecommunications across Europe. Given the current rate of change there are many intriguing challenges for future FITCE congresses.

**Andy Valdar**

**LIST OF ABBREVIATIONS**

ADSL = asymmetric digital subscriber line
CCITT is renamed as...
ITU-T & ITU-R = International Telecoms. Union – Telecoms. & Radio
CEPT = European Committee on Post & Telecoms
ETSI = European Telecoms Standards Institute
FDM = frequency-division multiplex
FTTH = fibre to the home
GPRS = general packet radio system
GSM = Global System for Mobile (originally Groupe Spécial de Mobile)
IDN = integrated digital network
IMS = IP multimedia subsystem
IP = internet protocol
ISDN = integrated services digital network
LAN = local area network
LEO = low Earth orbit
LTE = long-term evolution
NFV = network functions virtualisation
PABX = private automatic branch exchange
PAM = pulse-amplitude modulation
PCM = pulse-code modulation
PC = personal computer
PDA = personal digital assistant
PDH = plesiochronous digital hierarchy
PON = passive optical network
PSTN = public switched telephone network
SDH = synchronous digital hierarchy
SIP = session initiation protocol
SPC = stored-program control
SS7 = signalling system No 7
TCP = transport control protocol
TDM = time-division multiplex
VDSL = very high-speed digital subscriber line
VoIP = voice over IP
VoLTE = voice over LTE
WDM = wave-division multiplex

# Catalogue of FITCE Congresses and their Themes

Luxembourg – LUXEMBOURG – 03.09-09.09, 1962.

Roma – ITALY – 30.09-05.10, 1963.

Paris – FRANCE – 29.06-04.07, 1964.

's Gravenhage – NETHERLANDS – 28.06-03.07, 1965.

Frankfurt am Main – GERMANY – 23.05-28.05, 1966.

Brussels – BELGIUM – 03.07-08.07, 1967.

Luxembourg – LUXEMBOURG – 09.09-14.09, 1968.

Lyon – FRANCE – 22.09-27.09, 1969.

Venezia – ITALY – 01.06-06.06, 1970.

Amsterdam – NETHERLANDS – 20.09-25.09, 1971.

Stuttgart – GERMANY – 25.09-30.09, 1972.

Brüssels – BELGIUM – 25.06-30.06, 1973.

Luxembourg – LUXEMBOURG – 02.09-07.09, 1974.

Nice – FRANCE – 08.09-13.09, 1975.

Firenze – ITALY – 13.09-18.09, 1976.

Rotterdam – NETHERLANDS – 12.09-17.09, 1977.

Berlin – GERMANY –11.09-16.09, 1978.

Dublin – IRELAND – 03.09-08.09, 1979.

Liège – BELGIUM – 01.09-06.09, 1980.

Luxembourg – LUXEMBOURG – 31.08 –05.09, 1981.

Bordeaux – FRANCE – 06.09-11.09, 1982.

Madrid – SPAIN – 19.09-24.09, 1983.

Roma – ITALY – 10.09-15.09, 1984.

Regensburg – GERMANY – 09.09-14.09, 1985.

's Gravenhage – NETHERLANDS – 08.09–13.09, 1986.

Athinai – GREECE – 30.08-05.09, 1987.

Cork – IRELAND – 04.09-10.09, 1988.

Lisboa – PORTUGAL – 03.09-09.09, 1989.
*Title: European Telecommunications – Facing up to 1992*

Glasgow – UNITED KINGDOM – 27.08-01.09, 1990.
*Title: Networks 2000*

Strasbourg – FRANCE – 02.09-07.09, 1991.
*Title: Pan European Networks and Services*

Granada – SPAIN – 27.09-02.10, 1992.
*Title: European Telecommunications – Facing up to 1992*

Antwerp – BELGIUM – 30.08-04.09, 1993.
*Title: Broadband Networks in the Europe of tomorrow and the impact on the residential and business users*

Dresden – GERMANY – 29.08-03.09, 1994.
*Title: The European Challenge to Telecommunications in East and West*

Bologna – ITALY – 11.09-16.09, 1995.
*Title: Telecommunications Management*

Vienna – AUSTRIA – 27.08-01.09, 1996.
*Title: Multimedia-Services on the Telco-Networks of Europe*

Thessaloniki – GREECE – 22.09-27.09, 1997.

London – UNITED KINGDOM – 24.08-28.08, 1998.
*Title: Diverging roles in a conversing marketplace*

Utrecht – NETHERLANDS – 24.08-28.08, 1999.
*Title: Networking the Future*

Limerick – IRELAND – 23.08-26.08, 2000.
*Title: New Dimensions, New Challenges*

Barcelona– SPAIN – 21.08-25.08, 2001.
*Title: European Odyssey: Telecommunications in the e-Society*

Genua – ITALY – 04.09-07.09, 2002.
*Title: Evolving Networks: Service Opportunities and Market Realities*

Berlin – GERMANY – 04.09-06.09, 2003.
*Title: Evolving Communications: Making Human Dreams Real*

Ghent – BELGIUM – 08.09-11.09, 2004.
*Title: To Boldly Go ... On-line Anytime, Anywhere. A vision for the Future of ICT Services*

Vienna – AUSTRIA – 01.09-03.09, 2005.
*Title: The Magic Potion to Meet Customers' Desires!*

Athens – GREECE – 29.08-31.08, 2006.
*Title: "Telecom Wars: The Return of the Profit*

Warsaw – POLAND – 30.08-01.09, 2007.
*Title: The Broadband Way to the Future*

London – UNITED KINGDOM – 03.09-06.09, 2008.
*Title: The Magical Mystery Tour Next Stop...True Convergence?*

Prague – CZECH REPUBLIC – 30.08-01.09, 2009.
*Title: ICT Transformation: Global InfoSociety Realization in 2009?*

Santiago de Compostela – SPAIN – 01.09-04.09, 2010.
*Title: The Way of Santiago and European Telecommunications*

Palermo – ITALY – 08.09-10.09, 2011.
*Title: ICT: Bridging an Ever-Shifting Digital Divide*

Poznan – POLAND – 05.09-08.09, 2012.
*Title: "Everything in the Net – IPv6 and Internet of the Future Prospects*

Leuven – BELGIUM – 04.09-07.09, 2013.
*Title: Moving towards Trustworthy Digital Ecosystems*

Naples – ITALY – 12.11-15.11, 2014.
*Title: From Network Infrastructures to Network Fabric: Revolution at the Edges*

Wroclaw – POLAND – 03.09-05.09, 2015.
*Title: ICT for Smart Applications*

Athens – GREECE – 01.09-03.09, 2016.
*Title: Towards a Smart Interconnected Society*

Madrid – SPAIN – 14.09-16.09, 2017.
*Title: The Digital Transformation: A Challenge for ICT Engineers*

Salford – UNITED KINGDOM – 07.09-09.09, 2018.
*Title: Delivery and Consumption of Digital Media*

Ghent– BELGIUM – 25.09-27.09, 2019.
*Title: Smart Cities & ICT*

Krakow – POLAND – 2020.
*Due to Covid restrictions the physical congress was replaced by articles in a special edition of the Journal of Telecommunications and Information Technology – themed 5G.*

Gala Dinner, Salford, UK 2018

FITCE Director's (CD) meeting in Athens, 2016

Reception, Ghent, 2019

Singing contest, Limerick, 2000

CD and partners sight seeing in Prague, 2009