

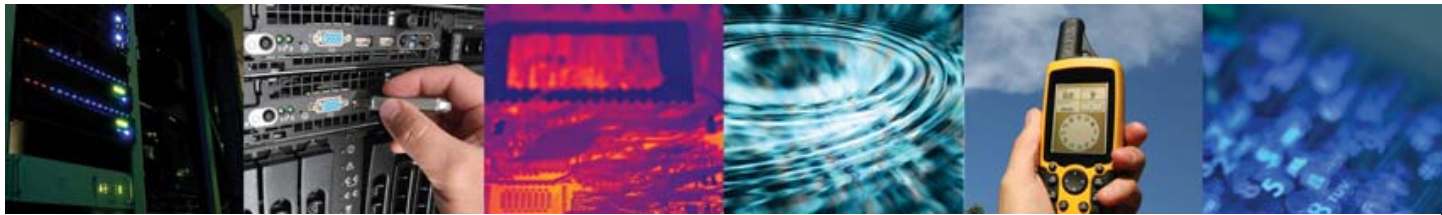
Introduction

ITSF 07 – London

Welcome & Welcome back!

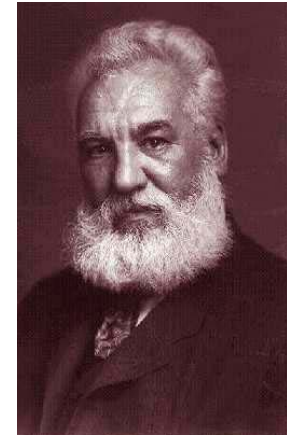
Charles Curry, B.Eng, FIET
Founder & Managing Director
Chronos Technology Ltd
Founder & Steering Group Chairman
ITSF – International Telecom Sync Forum



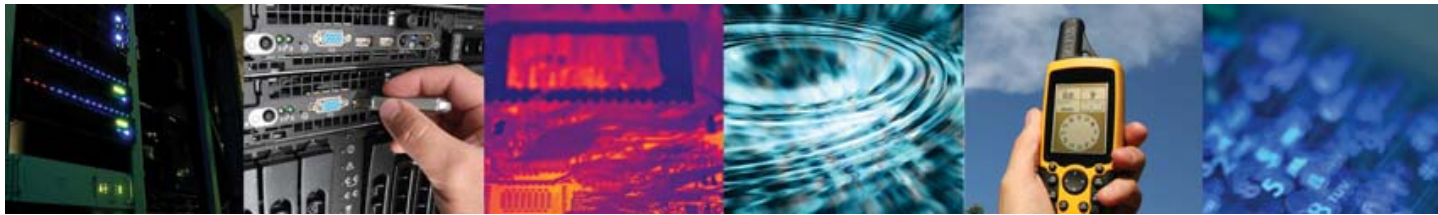


Links – What's in Common?

- Alexander Graham Bell - 1872
- Hedy Lamarr - 1942
- Norman Collier – Mid 70's

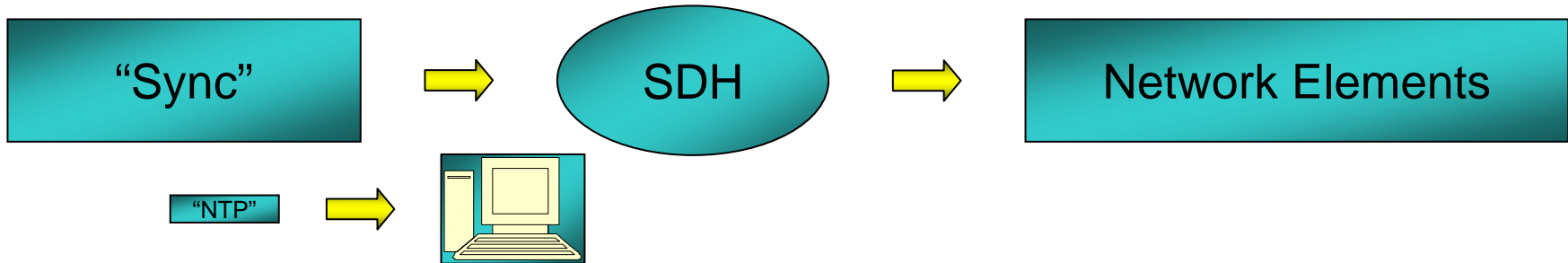


The Link will emerge during this Introduction

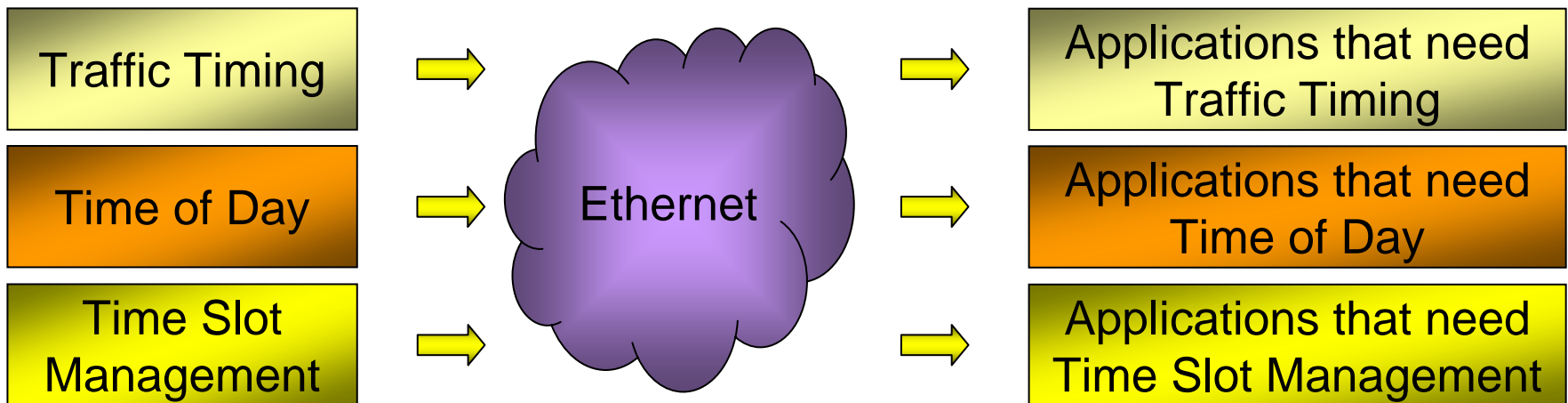


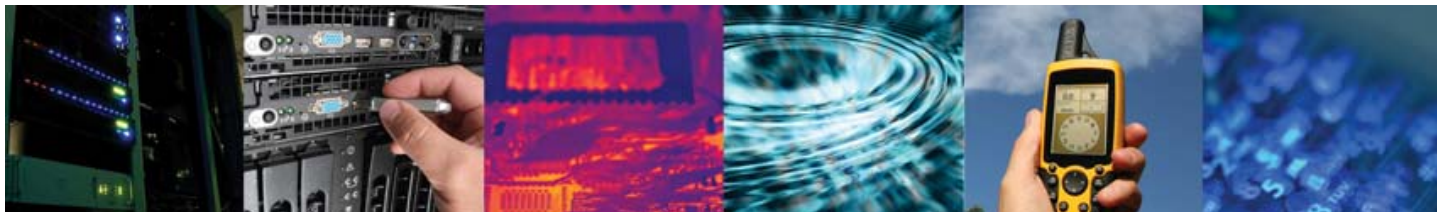
Once Long Ago.....

Life was simple!



Now NGNs complicate the issue.....

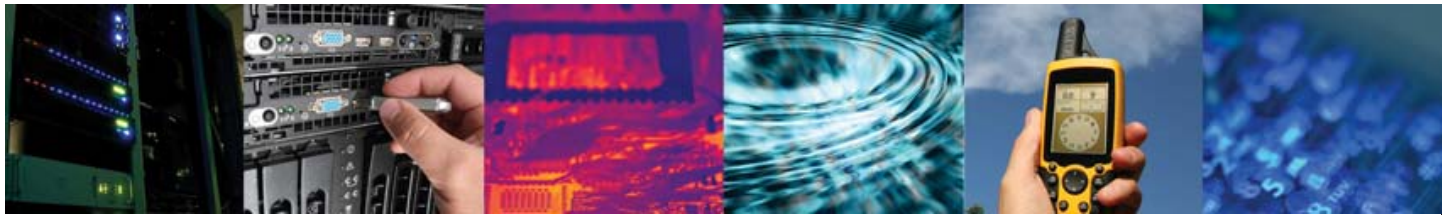




Timing is about Traffic speed

- Digital telecom traffic is either bits or packets – just like cars and buses on the roads
- Telecom industry has been using “**Active Traffic Management**” for 20 years
- When it goes wrong on the roads – we have traffic jams
- When it goes wrong in Telecoms we don't allow traffic jams!
- **We sacrifice data to enable traffic flow!**
 - Sound and vision traffic compromised
 - Loss of data
 - Large file resends
 - Corrupted data
 - Dropped Calls
 - TV & Radio compromised

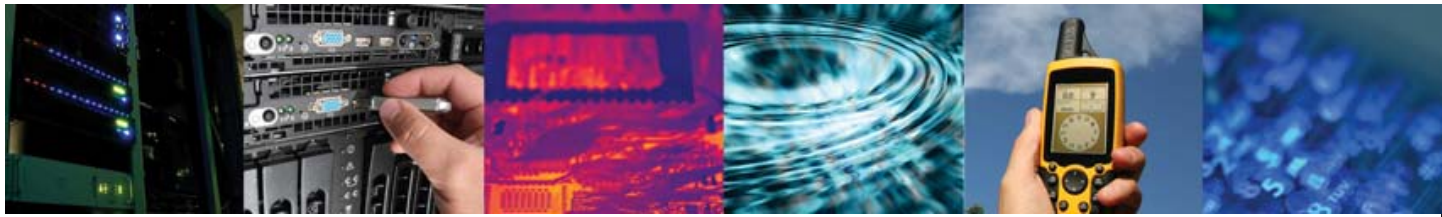




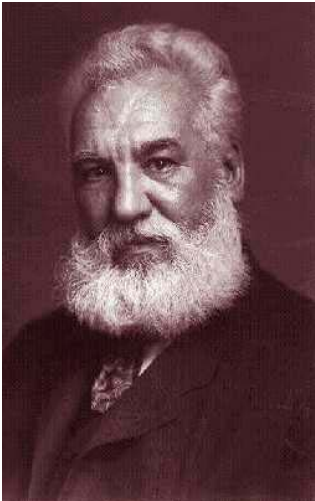
NGN Revolution

- Putting fast Ethernet from core to edge - No more roads, only high speed railways
- Connected Traffic e.g. Voice, Video must arrive in the right order,
 - **Without variable delays**
 - Or we get the “Norman Collier” effect
- BT has spearheaded an international change in ITU Standards
 - Spending £billions on their 21C network
 - £millions on their model!
 - Upgrading their national timing platform
- “Chunnel” Train packed with cars & buses

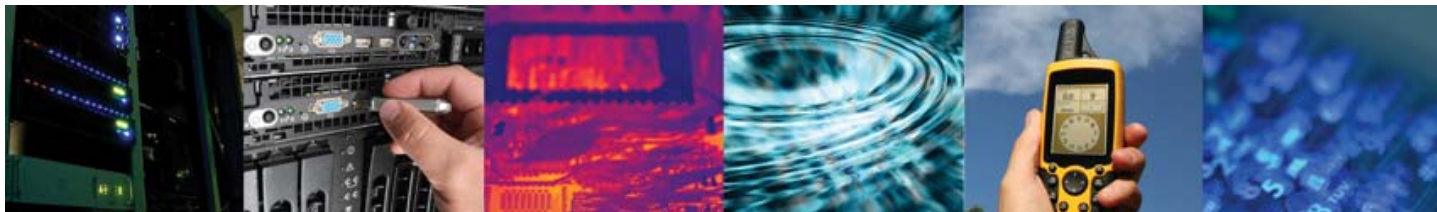




Time of Day – “POTS”



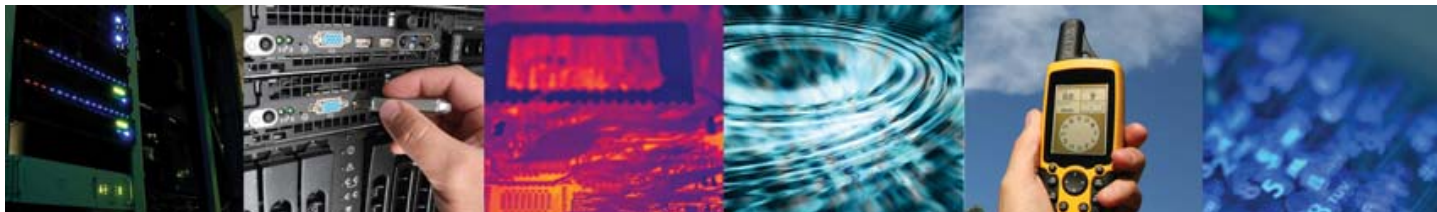
- Call records – billing
- Legal proof in “dangerous driving” cases
- Terrorist threat – New EU “Data Retention Act”
- “NTP” client in your PC, VoIP phone...
- **“POTS” – Plain Old Telephone Systems**
- Alexander Graham Bell



Time Slot Alignment – “PANS”

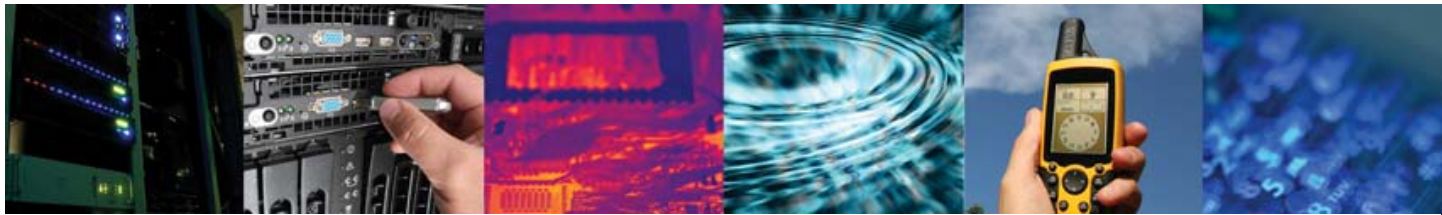
- Traffic throughput in digital comms
- Efficiency in CDMA (LTE) traffic
- WiMax, WiBro, TETRA
- **“PANS” – Pretty Amazing New Stuff**
- 1942 US patent 2,292,387 for a “secret” communications technique - the bedrock for Spread Spectrum Communications
- Hedy Lamarr





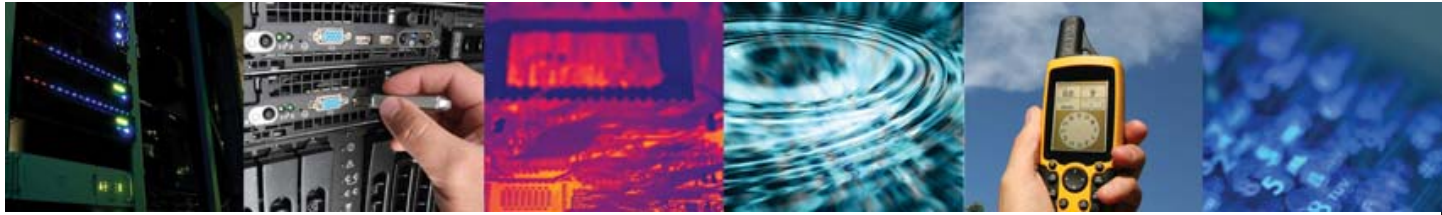
Migration To NGN – “PANS”

- PDH → SDH → ATM → All IP (NGN)
- IP networks form the traffic transport systems of the future
- Time and Timing must be transported over Ethernet
 - A fundamentally asynchronous transport medium!
 - **Why.....? How.....?**
- **Why?**
 - Everyday applications will just stop working!
 - More in a moment.....
- **How?**
 - More GPS?
 - Synchronous Ethernet?
 - Packet Timing?
 - Better NTP?
 - Something Else?



The “Why?” - Impact on Applications if Timing Compromised

- Dropped mobile calls
- Poor or failed call handovers in mobile networks
- VoIP – gaps in speech
- Video – gaps in speech and vision
- Data transfer – slower speed, resend data
- Loss and corruption of data
- Wireless Broadband (WiMax & WiBro) failure
- Disruption to radio communications systems
- Disruption to TV & Radio Broadcast Networks



Should we be worried....?

Gloom



Jeremiah

Revenue Assurance

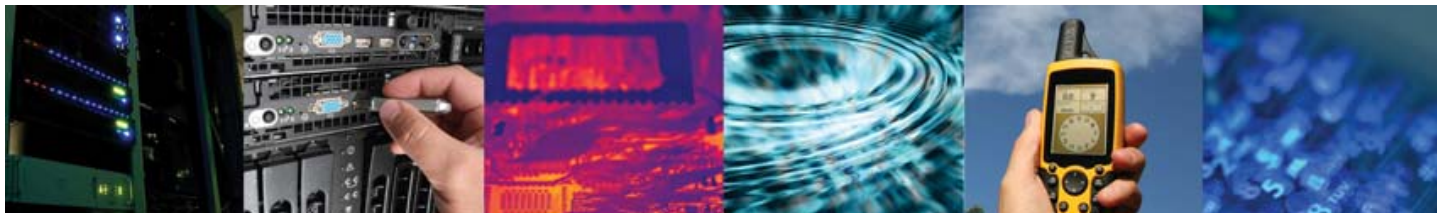
Network Failure



Michel de Nostredame (1503 – 66)

Nostradamus

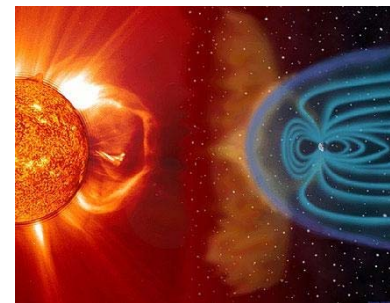
End of the World

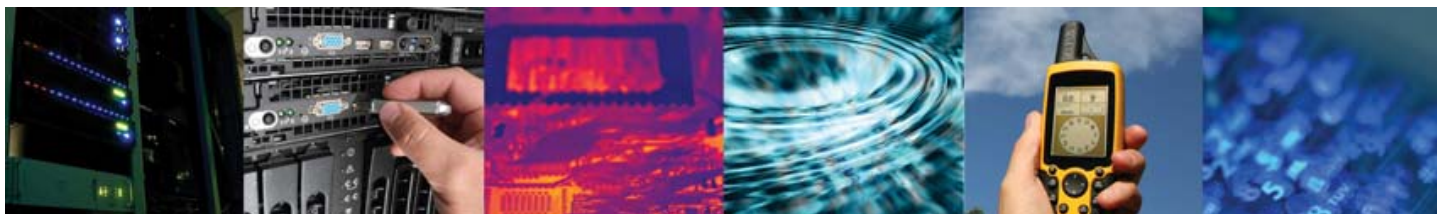


Horror Story “Headlines”



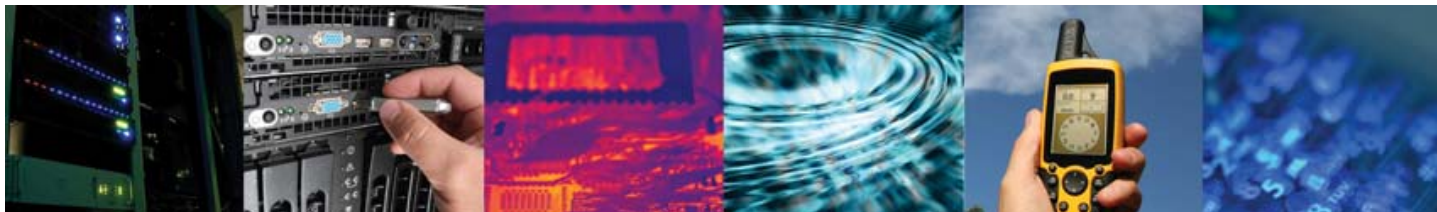
- **“D-Link accused of ‘killing’ time server”**
 - http://www.theregister.co.uk/2006/04/13/d-link_time_row_escelates/
- **“GPS could be terrorist target”**
 - <http://archives.cnn.com/2002/US/01/08/ret.gps.terror>
- **“Military ‘accidentally’ jams GPS”**
 - <http://forums.groundspeak.com/GC/index.php?showtopic=160821>
 - <http://mg.gpsworld.com/gpsmg/article/articleDetail.jsp?id=418420#H2>
- **“In-car GPS jammer subverts mobile tracking devices”**
 - <http://www.engadget.com/2007/07/31/in-car-gps-jammer-subverts-mobile-tracking-devices/>
- **“Solar flare puts GPS off the air”**
 - http://www.gcn.com/print/26_08/43512-1.html





But its going to be alright - The Cavalry is Coming!

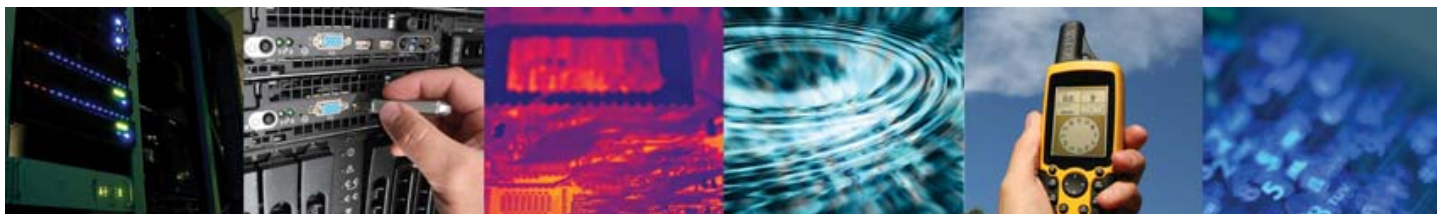




The “Cavalry” - New Standards Emerging....

- ITU – International Telecommunications Union
 - Study Group 15 Question 13
 - G.8261 – (G.pactiming)
 - G.8262 – (G.paclock)
 - G.8263 – (G.paclock-bis)
 - G.8264 – (G.pacmod)
- ETSI – European Telecommunications Standards Institute
- IEEE – Institute of Electrical & Electronic Engineers
 - Precision Time Protocol Working Group
 - IEEE 1588v2 PTP - Packet Time Protocol
- IETF – Internet Engineering Task Force
 - TICTOC - Timing over IP Connection and Transfer of Clock
 - ‘BOF’ – Birds of a Feather
 - NTP - Network Time Protocol v4
- ATIS – OPTXS Optical Transport & Synchronization Committee
 - Report on “Synchronization of Packet Networks” – Q307

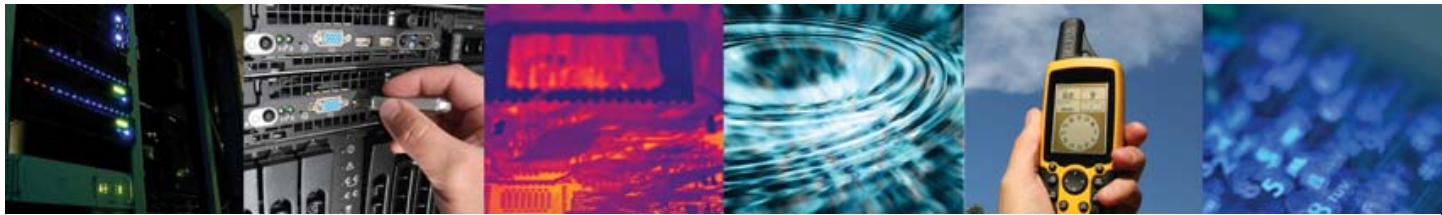




“More Cavalry”!

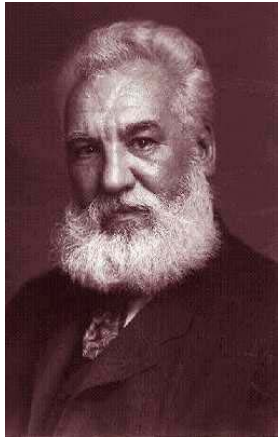
- 3GPP – 3G Partnership Project
 - Liaison Statement from ITU SG15/Q13 on Synchronization in Radio Access Networks
 - RAN WG1 & 4: Phase & Freq Sync at Radio Interface
 - RAN WG3: LTE/MBMS – TS36.300
- SMPTE - The Society of Motion Picture and Television Engineers
EBU - European Broadcasting Union
 - Joint Task Force - future needs for timing and synchronization in broadcast
- MEF – Metro Ethernet Forum
 - Mobile Backhaul Work Group
 - MEF 8, MEF 18, Circuit Emulation Services over Ethernet
 - Liaison with ITU SG15/Q13 for MEF 10.1
- IP/MPLS Forum
 - Liaison sought with ITU SG15/Q13
- CableLabs
 - DOCSIS 3
 - DTI – DOCSIS Timing Interface - SP-PHYv3.0



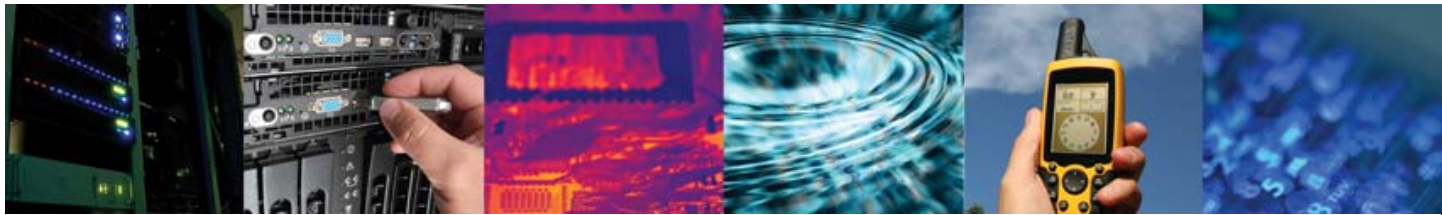


Finally – What's in Common?

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- Hedy Lamarr - 1942
- Norman Collier – mid 70's



*Modern communications distilled from **Alexander Graham Bell** and adopting spread spectrum communications from **Hedy Lamarr's** patent will sound like **Norman Collier** if we don't get the timing right*



Conference Theme

Good Timing

The new Paradigm for ***“Revenue Assurance”***