Past World-Class Events: Reflections on Network Reliability Issues

"30 Years of CQR & 20 Years of World-class Games Debriefing to CQR"

Presentation to:

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Palindrome Technologies

Assurance, Trust, Confidence

Telecommunications & World-class Sports Events

- World-class sports events (e.g. Olympic Games, FIFA World Cup, European/Asian/Pan-American Games) regardless of the host city, become the largest telecom project ever undertaken for a single event
- The role of telecommunications becomes one of the critical differentiators for winning a bid or host large sports events
- A highly complex, yet extremely reliable and robust, telecom network is needed to deliver the broadcast images to the world
- *The "IOC* Olympic Games Framework"* (produced for the 2024 Olympic Games) states:
  - "Telecommunications and technology <should be> at current international standards"
  - "A mission-critical component of Olympic Games technology delivery is the integration and distribution of timing, scoring and results data"

IOC: International Olympic Committee

Olympic Telecom Network Challenges: Quotes

- “Continue full network reliability support for existing customers, while absolutely fulfilling the telecommunications needs of the mega-event (i.e., Olympic Games)”
- “Full network redundancy ensuring a constant feed from the venue to the broadcast center”
- “Massive upgrades of hardware and software”
  - Several 100K miles of fiber cable
  - Several 100% increase in wireless capacity
- “Everything we build has to have a planned re-use”
- “100s people-years of effort to find the right balance of reliable & gee-whiz technologies to insure the success of a 17-day event”
- “Volume isn’t the key issue -- Strategic Network Reliability is”

No Tolerance for Failure

Telecom Technological Showcase in World-class Events - 1

Past World-class Events	Location /Year	Technological Showcase (special occasion)
Summer Olympic Games	Atlanta 1996 (USA)	Use SONET Rings as part of the Olympic Network
Summer Olympic Games	Sydney 2000 (Australia)	Use of PSTN as part of the Olympic Network ("Year 2K", Millennium Network)
Winter Olympic Games	Salt Lake City 2002 (USA)	• Use of Optical Cross-connect Systems • Use of satellites to secure remote fiber-optic cables (First Olympic Games after Sept. 11, 2001)
Summer Olympic Games	Athens 2004 (Greece)	First ever: • 3G wireless technology for the Games • Experimental 3D video taping of the Opening ceremonies (Ancient Olympia - birth place of the Olympic Games - as a competitive venue)
Summer Olympic Games	Beijing 2008 (China)	First ever Olympic Games to have full digital coverage freely available around the world

Telecom Technological Showcase in World-class Events - 2

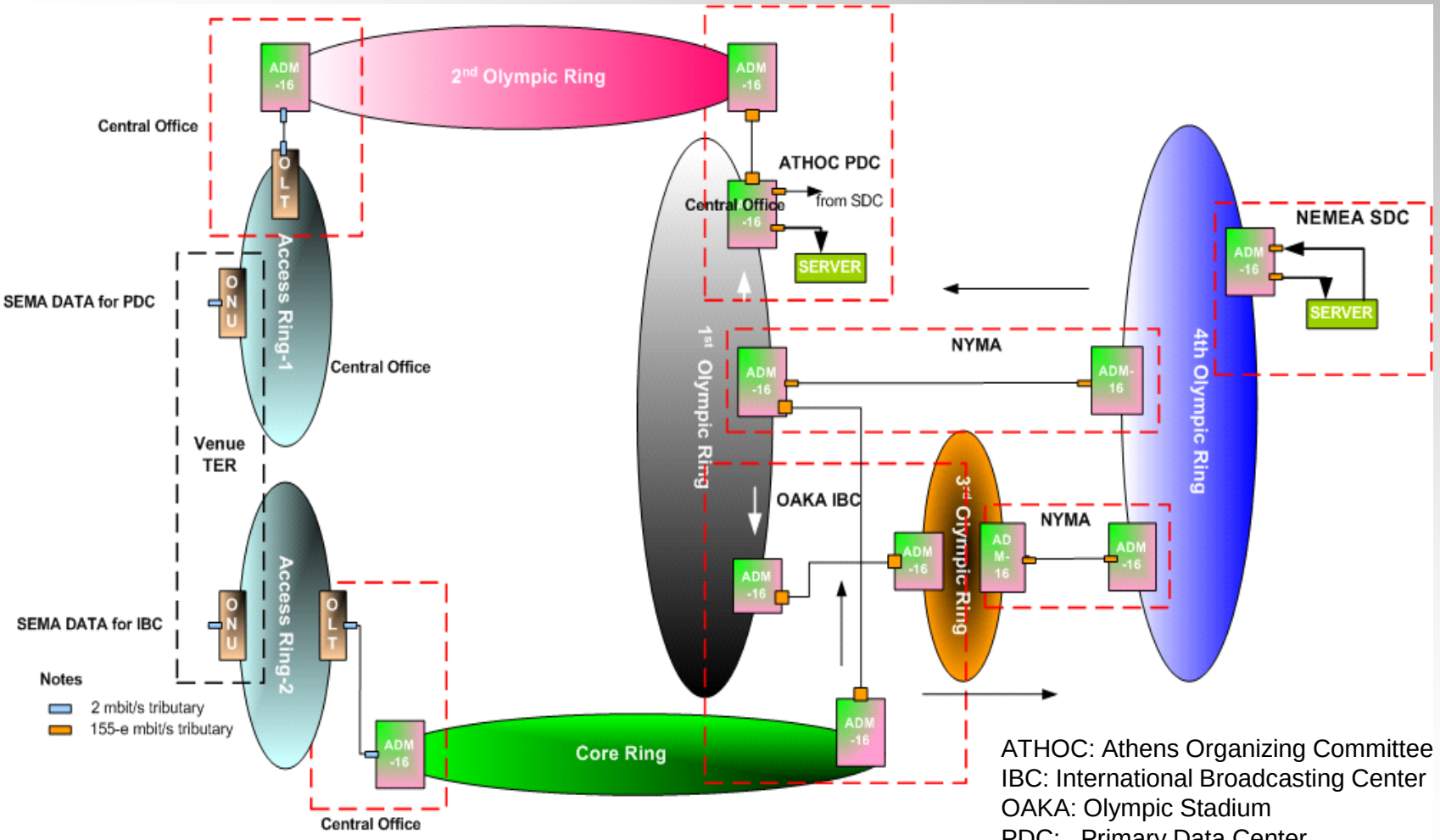
Past World-class Events	**Location /Year**	**Technological Showcase (special occasion)**
Winter Olympic Games	Vancouver 2010 (Canada)	Landmark event in the emergence of mobile phones as a multi-media platform
Summer Olympic Games	London 2012 (England)	Mixture of an IT cloud and more old-style systems involving unique construction and maintenance. For the first time: • 3D broadcast was featured • The IOC provided live broadcast of the Games via its YouTube channel • Digital broadcast coverage exceeded traditional analog broadcast coverage
Winter Olympic Games	Sochi 2014 (Russia)	Record engagement through: • Mobile platforms to Olympic websites • Social media followers for any Games
European Games	Baku 2015 (Azerbaijan)	First ever: • Fully cloud-based IT • System integrator as a “Grand Telecom Sponsor”

Telecom Technological Showcase in World-class Events - 3

Future World-class Events	**Location /Year**	**Technological Showcase (special occasion)**
Winter Olympic Games	PyeongChang 2018 (South Korea)	Early implementation of 5G (???)
Summer Olympic Games	Tokyo 2020 (Japan)	“Standardized” 5G (???)
Winter Olympic Games	Beijing 2022 (China)	SDN/NFV (???)
Summer Olympic Games	<Host City?> 2024 Candidate Cities: •Budapest, (Hungary) •Los Angeles (USA) •Paris (France) •Rome (Italy)	IOC is to select the host city in Sept. 2017

Athens 2004 Reference Architectures – Example

Games Data Network Link for IBC/PDC and Nemea SDC



ATHOC: Athens Organizing Committee
IBC: International Broadcasting Center
OAKA: Olympic Stadium
PDC: Primary Data Center
SDC: Secondary Data Center
TER: Telecom Equipment Room

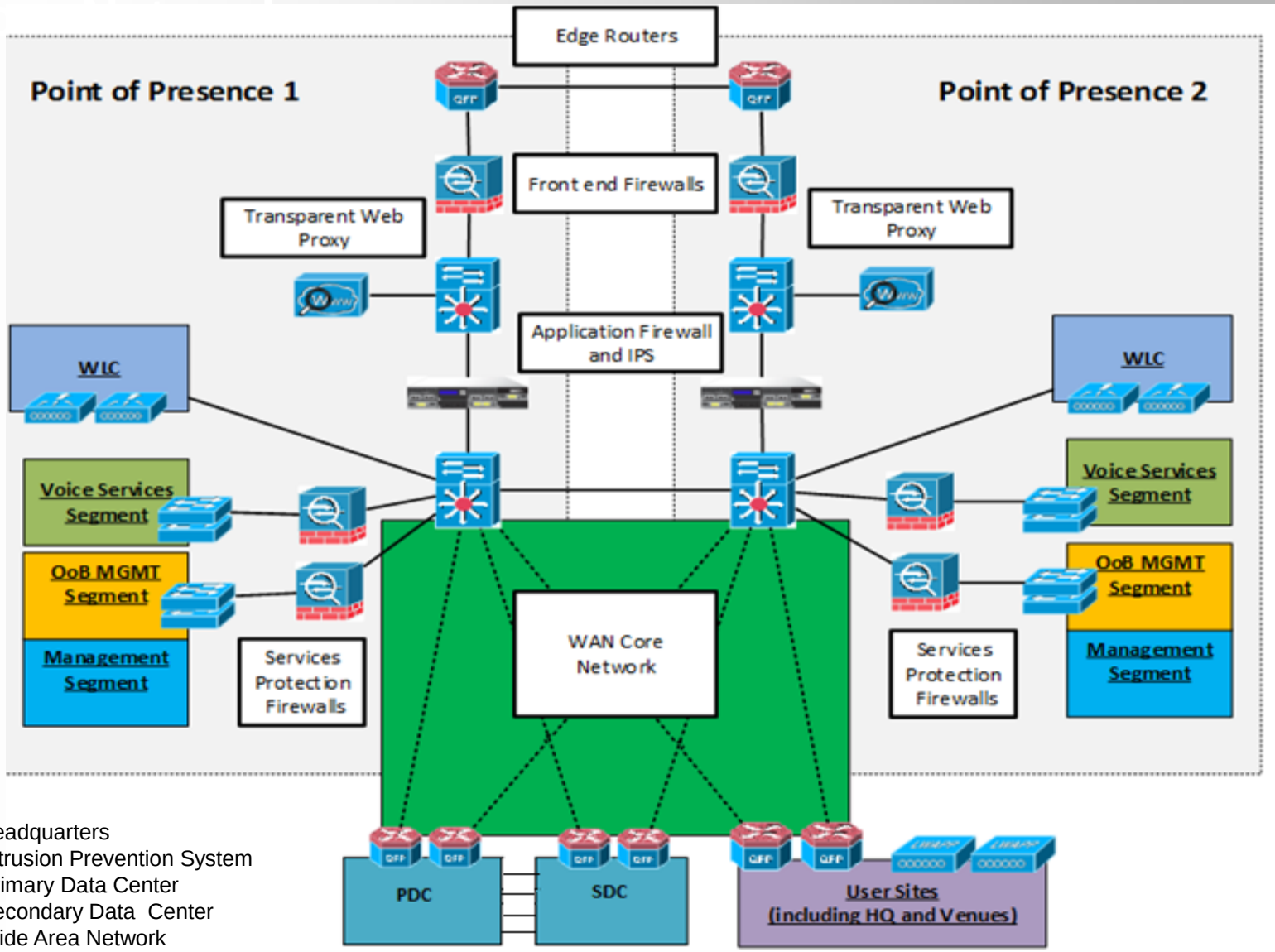
The Impact of Changing Technologies: A Double-Edged Sword!

Study Case: Atlanta 1996 (BellSouth) / Athens 2004 (OTE)

- Advantages
  - **Protection: "**Self-healing fiber" (SONET/SDH) rings
  - **Robustness:** Fiber is inherently more reliable than copper
  - **Performance Monitoring:** SONET/SDH gives a superior means of localizing a fault, detecting it, and resolving it
- Disadvantages
  - People make mistakes, especially when they are not familiar with new technology and equipment
  - Management or operational support systems may not be mature enough yet ("aren't brought up to speed")
  - Difficulties in service provisioning could result in outages
  - Mix in technologies may result in an interconnection nightmare

New technology can bring enormous reliability benefits to the network, but also can do a considerable amount of harm

POP-to-POP Logical Connections via the WAN



HQ: Headquarters
IPS: Intrusion Prevention System
PDC: Primary Data Center
SDC: Secondary Data Center
WAN: Wide Area Network
WLC: Wireless LAN Controller

Baku 2015
1st EUROPEAN GAMES

The Impact of Changing Technologies: A Double-Edged Sword!

Study Case: Baku 2015 European Games

- Advantages
  - The **first-ever**, cloud-based "network experiment" for a world-class sports event:
    - Succeeded and there was no service interruptions occurred in the Games telecom network during the 17-day Games period
    - Proved to be a viable network design for future such events
    - Proved that a system integrator company could be responsible for managing, operating, and monitoring the Games network
- Disadvantages
  - Unprecedented dependency on partners who were not sharing needed information (fierce competitors "forced" to become partners)
  - There was a higher "risk appetite" due to the extraordinary short time (1 yr) to built a network for such a world-class sports event
  - Supplier inventory management along with foundational technical services, device diagnostics, and alerts was a big problem due to the:
    - Lack of the supplier's in-country presence
    - Huge time difference (11 hrs) between the Supplier's Support Team at its headquarters and Baku
  - The 3-month prior to the Games "software freeze" rule was grossly violated due to supplier software "bugs" (e.g., firewalls)

Telecom Challenges for Future World-class Events

- Technology related
  - Convergence to SDN/NFV
  - Wireless technology (e.g., 5G Mobile Systems)
  - Broadcasting technology (e.g., trend for an all-HDTV coverage)
  - Optical Switching
  - Social media
- Host City related
  - Venue topology
- Culture related
  - Government / Local authorities' co-operation
  - Previous experience regarding large sports event
  - Language barrier (Is English the native language?)

Parting Thoughts…

Many thanks to CQR for giving me the opportunity for the past 20 years to share with you my Olympic Games experience

Questions?

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