ΑΘΗΝΑ 2004

World Class Events
IEEE CQR 2006 International Workshop

Telecommunications Challenges

ALEXIS ILIADIS

Telecommunications Consultant

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TECHNOLOGY'S MISSION

- Provide a completely integrated & cost effective technology solution to the Olympic and Paralympic Games.
- Satisfy the requirements of the ATHOC customers, the Olympic Family and spectators worldwide.
- Provide state of the art, yet mature, robust and commercially tested solution as the Olympic Games is not the place to trial or introduce new services and systems.
- Maintain technology operations at all venues especially for services which are transparent to Athletes, Spectators, Media/TV and to the Public.

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TELECOMMUNICATIONS STRATEGY

- In cooperation with Telecoms Sponsors, provide secure Games & Admin voice/data networks (WAN/LAN) solution, including all leased lines, structured cabling & active equipment
- In cooperation with Telecoms Sponsors provide all fixed, GSM, TETRA & wired telecommunications services and equipment to support Olympic operations
- Provide Cable Television network & equipment
- Provide all audio & visual systems & equipment supporting Sport Division & Sport Presentation operations
- Management & technical support on venue Telecom operations in cooperation with Technology Partners

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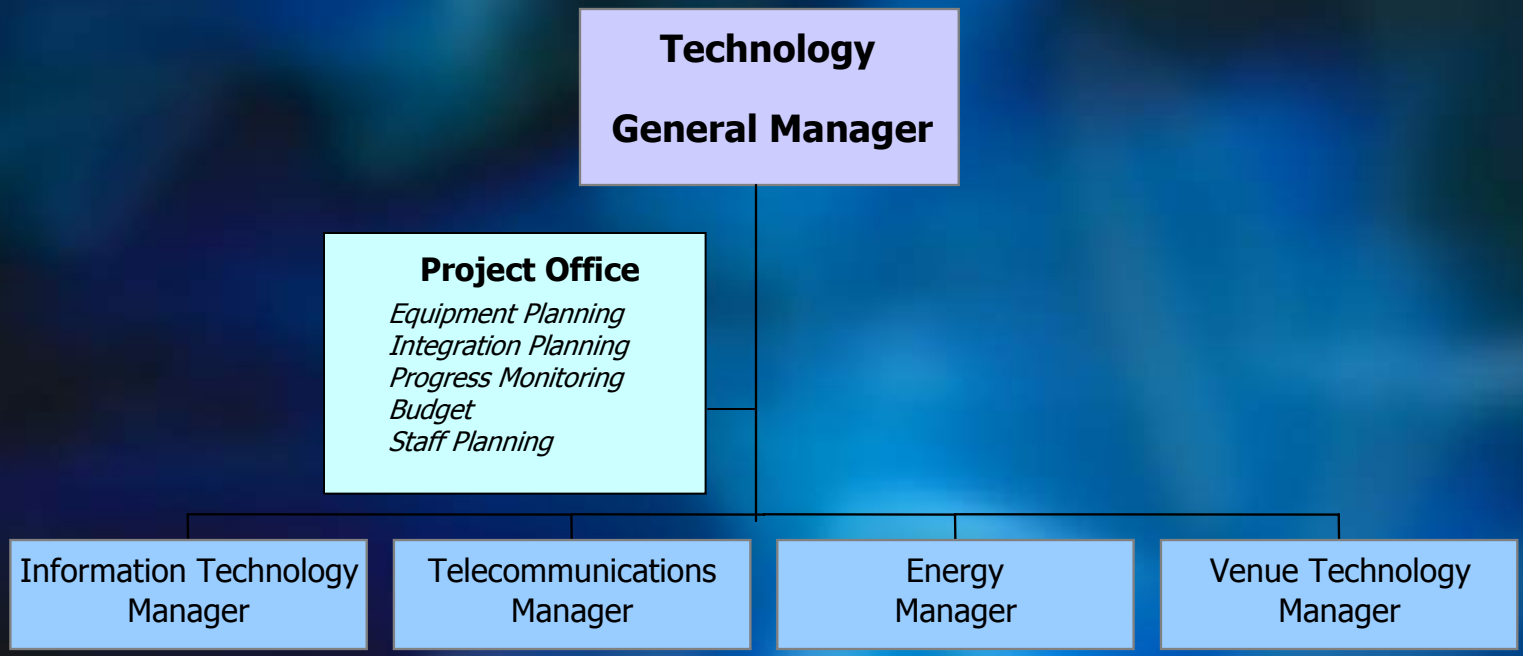
Technology Division Org Chart



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Technology Customers/Users

28 International Sports Federations

201 National Olympic committees

17,000 athletes & officials

2,650 technical officials (referees, judges, etc.)

15,500 (Rights Holders, AOB)

5,500 Written press & photographers

132,000; paid staff (13,810), volunteers (44,000) and contractors (74,000)

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Summary of Results

Greece staged exceptional Olympic & Paralympic Games

Greece demonstrated worldwide its capabilities for staging successfully the largest Sport Event in the world.

Games ran extremely smoothly

Telecoms/IT infrastructure & Energy performed extremely well

Exceptional knowledge has been accumulated and is now ready to be deployed in the local market

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How did we get there?

Long and careful planning period

Use previous games experience and adopt to local market peculiarities

Utilise sponsor's (national & worldwide) experience

Select high caliber staff & continuously challenge it to be on top

Well planned operations

Manage expectations, be flexible, responsive, & adaptable to the local business environment

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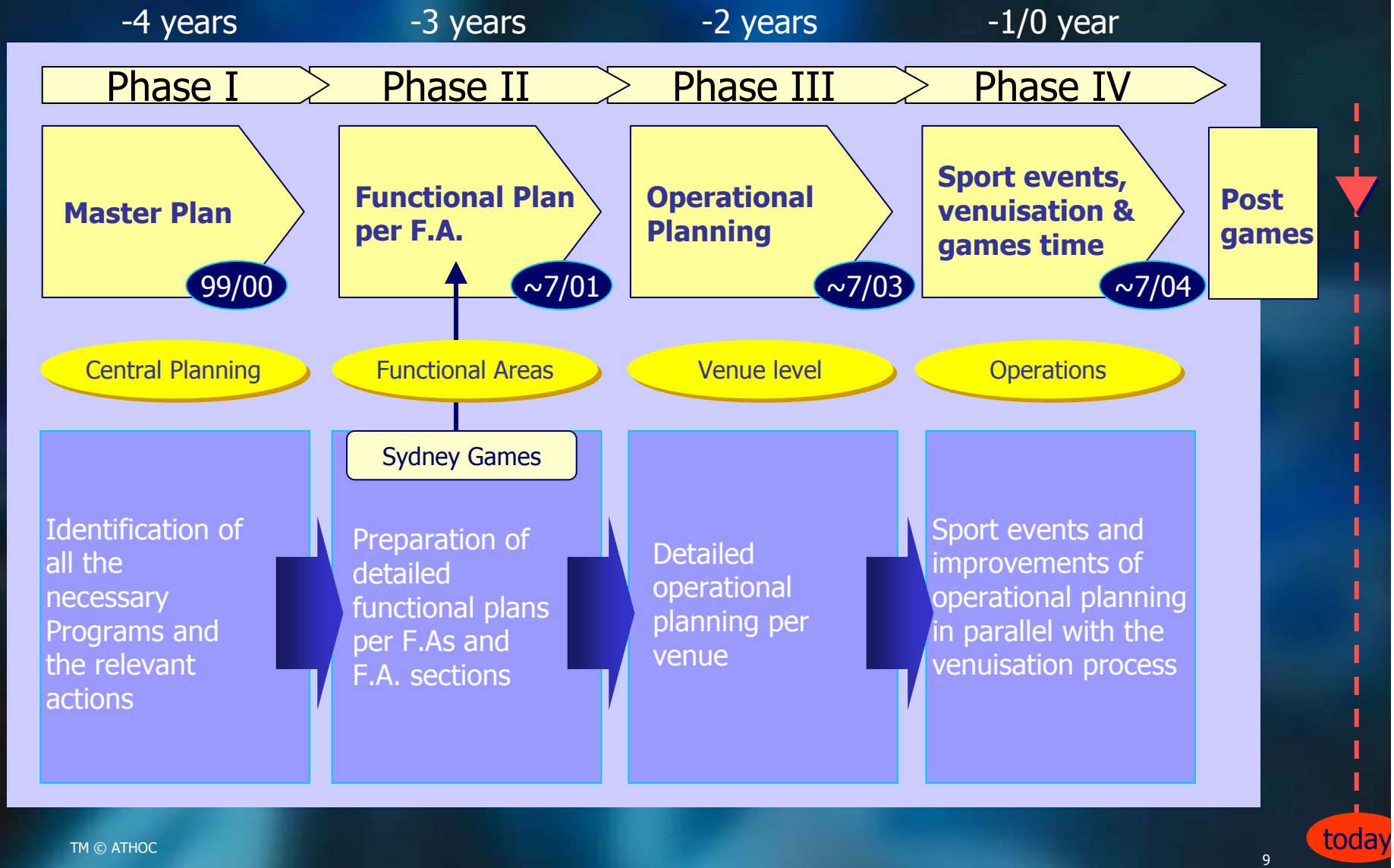
Planning Stages



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Some firsts as compared to local market

Games data network (WAN)

Olympic network & unified numbering via IN

Web hosting (official Athens 2004 site)

Dedicated network management systems

E- spectrum application

Wireless Olympic content distribution for Olympic family

Largest commercial tetra service

Largest ever operated cable TV network (broadband)

Huge logistics undertaking (handled thousands of devices)

Largest ever audio/video sports presentation systems

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Special Characteristics of the project

Variety of users from all over the world

Varying expectations and disciplines

Users arrive just before the games expecting everything to work the first time

Difficult to collect user needs (both internally & externally)

Require huge operations/support system to react to last moment changes/requests

No second chance to test and fix it (sport events were useful pilots)

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Athens' 2004 technology partners

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Key Figures for Services & Systems Deployed

Voice telephony (analogue, ISDN, etc): 39,000

ADSL services: 850 (capacity installed 3,500)

GSM phones: 13,900

Tetra terminals: 8,000

PCs & Laptops: 10,700

Intel servers: 500

Unix servers: 400

Cable TV network: 13,000 services

Audio systems: 540

Videowalls & big projection systems: 16

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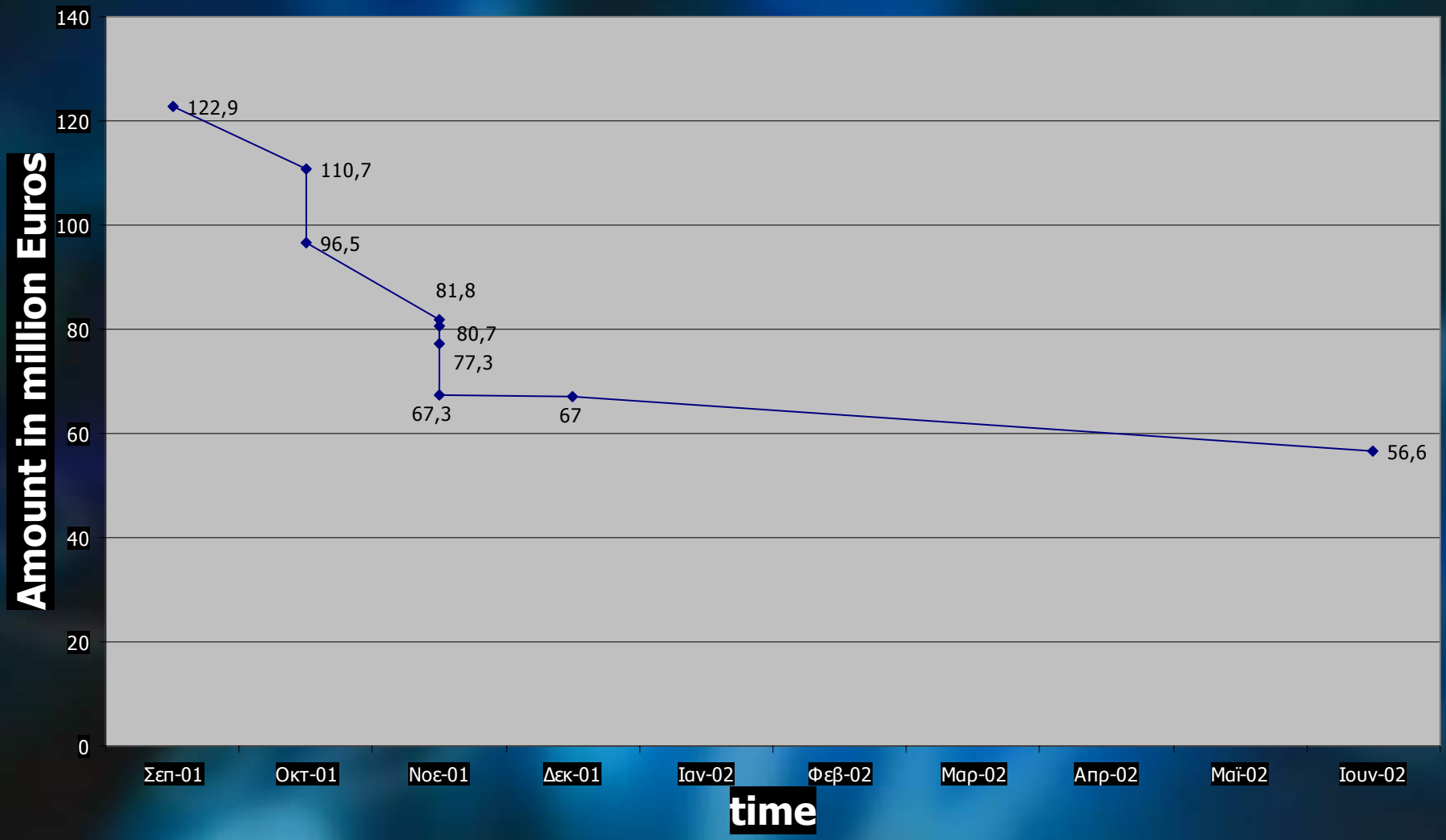
Telecommunications Budget Evolution



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Key Characteristics of the Systems Deployed

- Robustness
- Flexible and Expandable
- Easy maintenance/support
- Fully tested and proven technology
- Redundant architecture
- Capable to handle bursty and high traffic
- Re-useable and re-deployable
- Low cost solution
- Legacy to the nation

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Telecommunications Services

- Fixed Telephony Services
  - Olympic Network (5 digit)
  - Standard Telephone Connections
  - Public Card Phones
- Wireless Services
  - GSM Network
  - TETRA Network
- Data Networking
  - Passive and Active Networking Equipment
  - Leased Lines for Admin and Games Networks
  - Internet Access

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TETRA Network - Infrastructure

- OTE: the sponsor for the provision of Trunked Radio services
- Trunked Radio services are based on TETRA technology and the commercial TETRA network of OTE is used
- Spectrum availability of 2 MHz in the 410-430 MHz band
- Radio sites:
  - The network has in total 68 radio sites countrywide
  - 15 Olympic sites located inside or close to the venues
  - Transportable sites (2)

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TETRA Network - Dimensioning

- Network dimensioned for:
  - 8000 ATHOC users, and
  - a few more thousand of commercial and other Olympic users
- TETRA service to ATHOC users relied on group calls only
- Mean-call-duration of about 10sec
- Approximately 15 talk groups per venue
- 700 talkgroups in total
- Most of traffic volume is localized at venues. Limited traffic from wide area calls

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Mobile Phone Allocation

- Total of 13.900 mobile phones used
- Needs analysis process for the allocation of mobile phones to users
- Allocation finalized on May 2004
- Major mobile phones allocations are as follows:
  - Rate Card: 1.500
  - Venues: 10.400
  - PDAs: 2.000

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Radio Spectrum Management & Equipment Certification

(1) Ministry of Transportation and Communication (MTC)

- Manage legislative framework
- Coordinate broadcasting spectrum requests

(2) National Telecommunications and Post Commission (NTPC)

- Coordinate non broadcasting spectrum & handle licensing process
- Certify and label radio equipment & spectrum monitoring

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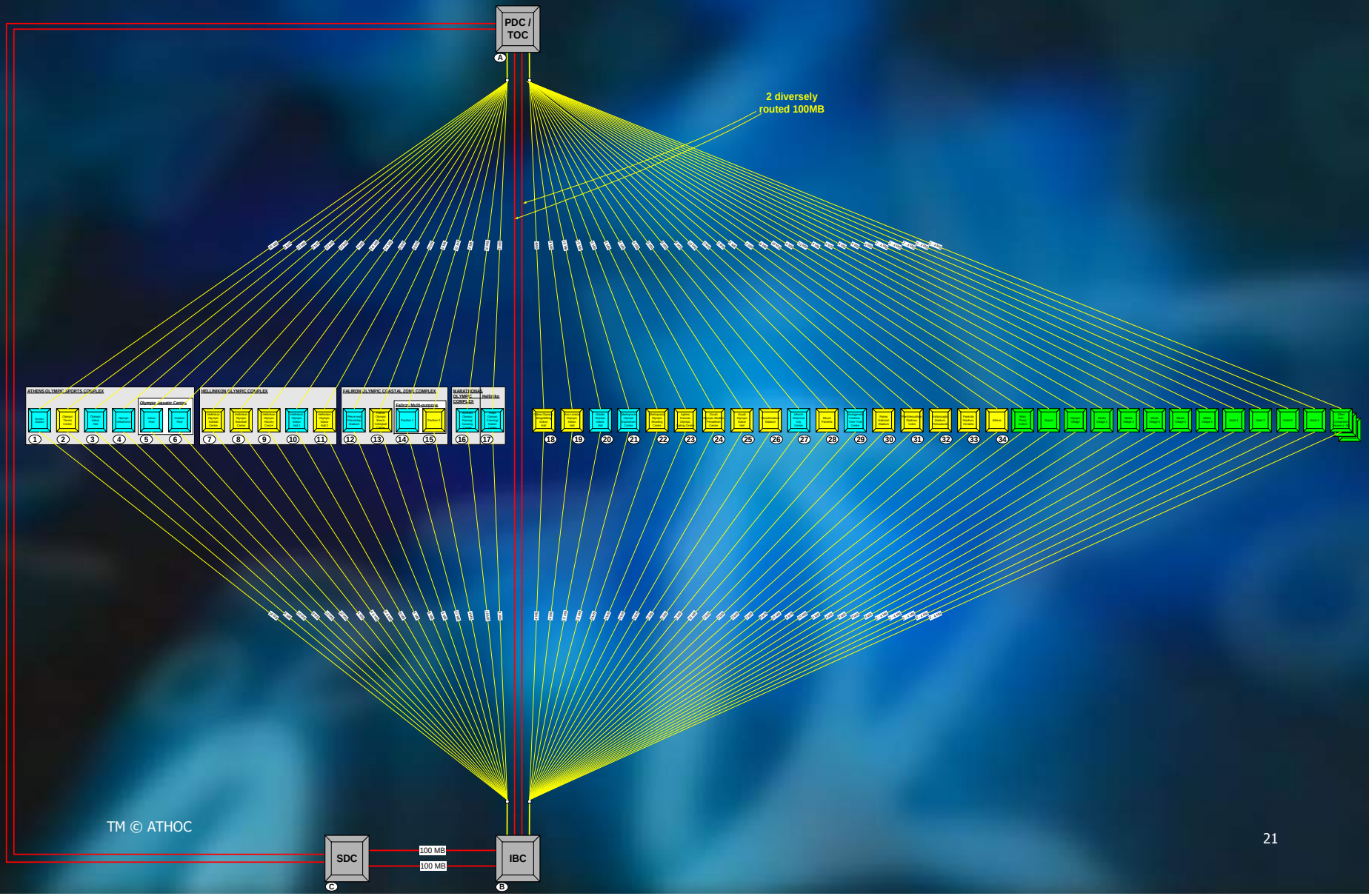
WAN ARCHITECTURE



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Audio Visual Systems

- Public address systems
- Large video displays (video boards – DLP projectors)
- Audio - Visuals Playback Kits
- Video protest systems
- Wired headsets communications
- Video viewing & and video copying services
- CATV Equipment (TV sets)
- Box Items (misc off the shelf audio systems)

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Cabling Works & It's Elements

- Installed Cable
  - Backbone Cable
    - 116 Km Copper cable
    - 139 Km Fibber Optic
  - Horizontal Cable
    - 1.862 Km for 19.025 Voice Drops & 12.000 Data Drops
  - Coaxial Cable
    - 260 Km for 12.000 CATV Drops
- Cabling provided by the Authorities
  - 840 Km Horizontal copper cable for 14.000 Voice & Data Drops
  - 52 Km Backbone copper cable
- 107 Km Specialized (point to point) cabling

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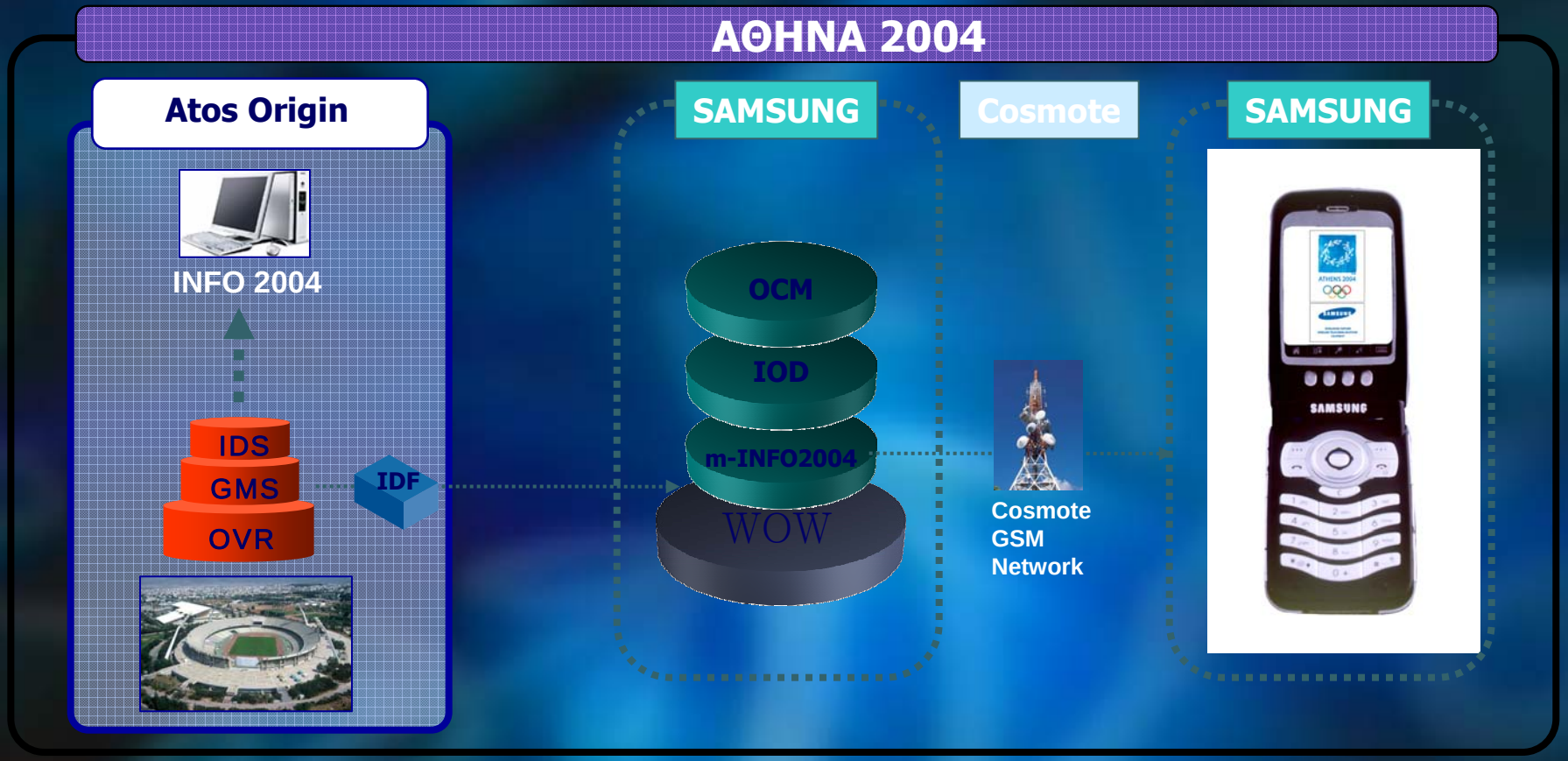
Wireless Olympic Works - WOW



OVR : On-Venue Results
GMS : Game Management System
IDS : Information Diffusion System

IDF : Internet Data Feed
IOD : Information On Demand
OCM : Olympic Community Messaging

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Lessons Learned

Positive

- Technology, Sponsors, Contractors :one team spirit
- Participation in all Test Events: test infrastructure and key systems
- Key role of the Venue Technology Department
- Energy matters to be part of the Technology Division
- Early arrival of Technology partners
- Early recruitment of the Venue Technology Managers
- Success in workforce selection and assignment
- Successful Equipment planning & allocation
- CAD section team critical to provide drawing services to all TEC staff

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Lessons Learned

Further improvements required

- Need to secure all necessary H/W, S/W, and corresponding services well in advance
- Technology Operations Centre (including TCC to be operational from the 1st Test Event)
- Support from contractors
- Increase the technology workforce, to support the venue teams
- Change management to follow more rigid control procedures

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Challenges / Issues

- On-time construction and delivery of venues
- Building a common culture among the Technology staff & partners
- Recruiting the "best" project managers for venues
- Budget constraints
- Smooth cooperation with Authorities
- Contract Management
- Co-operation with external contractors/sponsors
- Managing customer expectations for technology equipment and services

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Greece's Legacy from the Games

(1) Intangible - vast experience to:

Manage very complex projects

Deal with fixed timelines

Work and interact with the authorities and global business community

Manage complex and multi services/networks

Set up and tune complex and dense wireless and fixed networks

Public authorities have learned to work under tight timelines and to deliver projects on time

National pride that we did it right and in spite of our size

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Greece's Legacy from the Games

(2) Tangible

Purchased or supplied equipment via sponsorships, such as: PCs, Audio, Video, Data Equip., etc

Fibre installed and bandwidth availability to support broadband services in Attika area & elsewhere

Sufficient capacity to expand the OTElink (Tetra) service

Brand new call centre to support a multitude of services

Extra capacity for xDSL type of services

Brand new infrastructure and trained personnel to handle radio spectrum issues

Network management & service provisioning systems

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Next day

Private enterprise and governmental authorities alike should co operate and take advantage of this unique sporting event, which has put our country on the map, and immediately utilize both intangible and tangible resources in the areas of:

- Hosting international sporting events
- Conferences, exhibitions & trade shows
- Tourism
- Services (technology, transport, etc)
- etc.

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Thank You

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