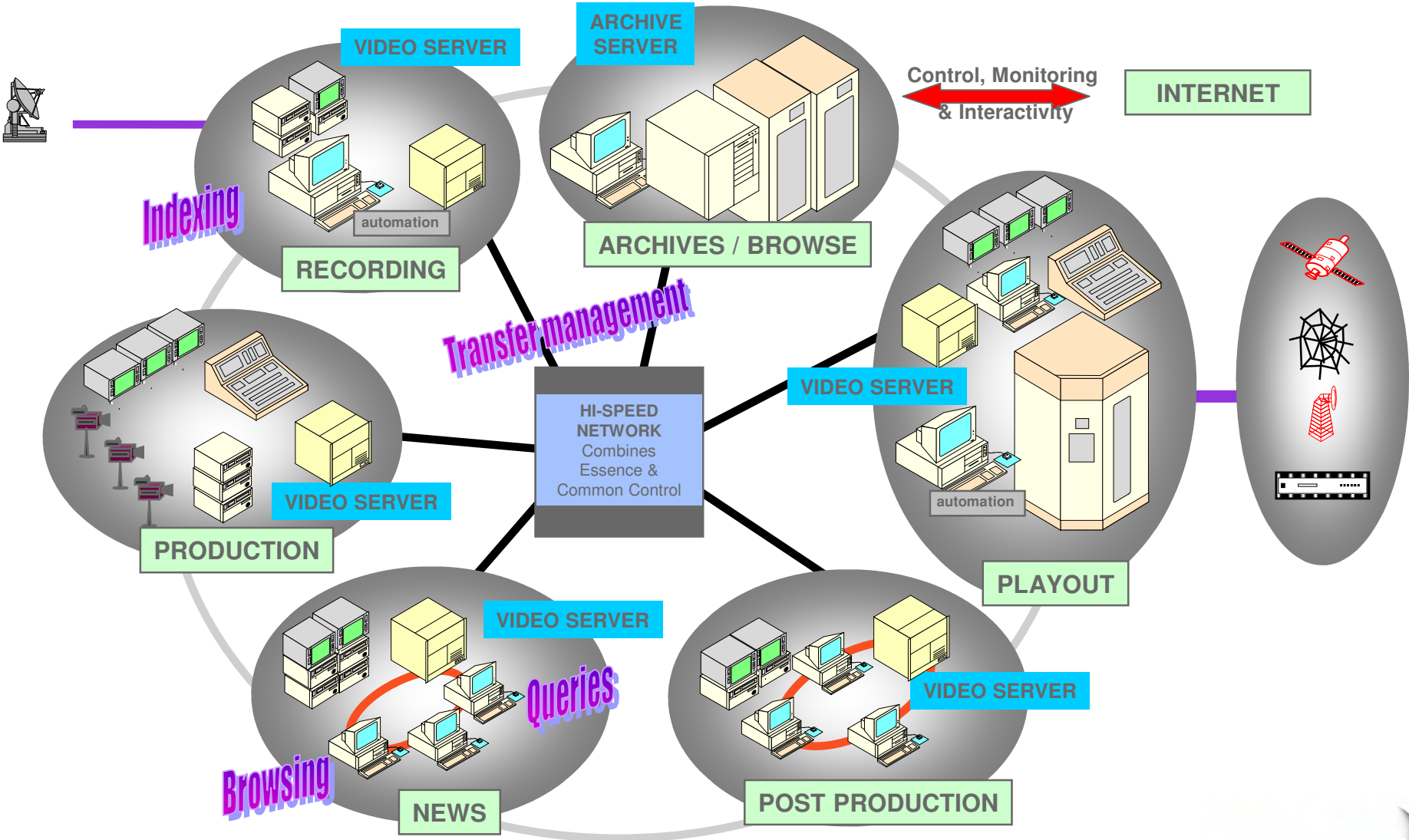# THOMSON
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IP Networked Studio Infrastructure
for
Synchronized & Real-Time
Multimedia Transmissions

Gaël MACÉ
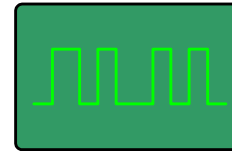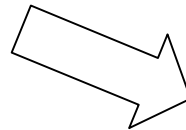CR / CP&M Lab. (Rennes / France)

24th January 2007

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Functional Overview Diagram

VIDEO SERVER

ARCHIVE SERVER

Control, Monitoring & Interactivity

INTERNET

Indexing

automation

RECORDING

ARCHIVES / BROWSE

Transfer management

HI-SPEED NETWORK
Combines Essence & Common Control

VIDEO SERVER

VIDEO SERVER

PRODUCTION

PLAYOUT

automation

VIDEO SERVER

Queries

Browsing

NEWS

VIDEO SERVER

POST PRODUCTION

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Studio evolution

ANALOGUE

Yesterday

DIGITAL

Today

Homogeneous and
fully interconnected

Tomorrow

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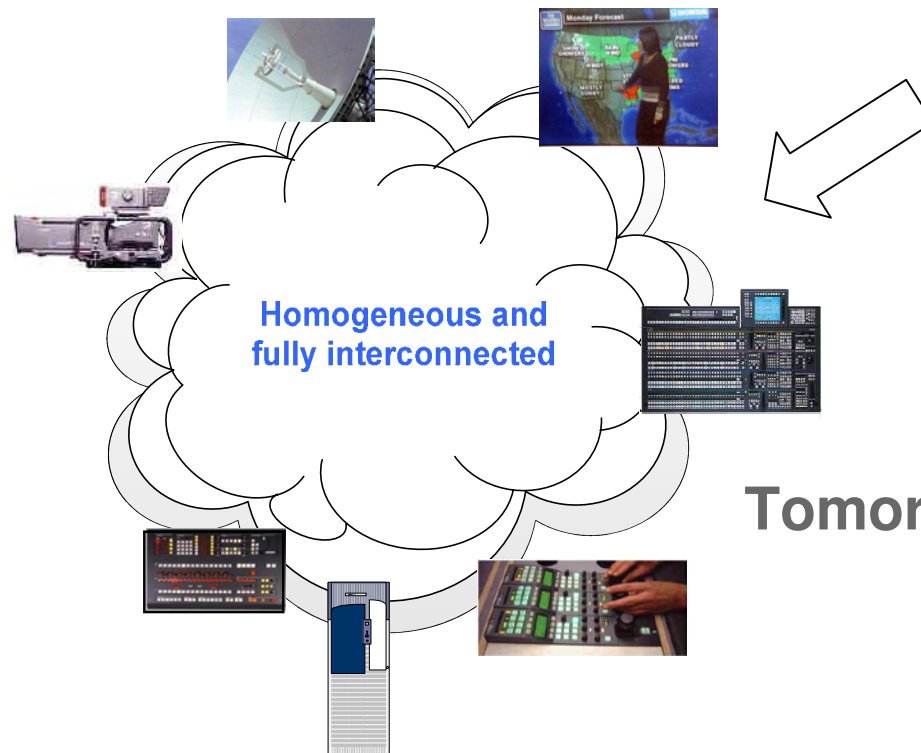
Studio infrastructure nowadays

- **Several and heterogeneous communication infrastructures**
  - According to their domain of constraints
    - real-time for production, non real-time for post-production
  - According to the essences they convey
    - Video, audio, synchronization, devices control/command, intercom (voice)
  - According to their technology
    - Analogical, digital, point to point, point to multipoint, synchronous, asynchronous
  - According to their communication mean
    - Signal processing, IP protocol, direct register access

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Overall Production Dataflow requirements

- **Bandwidth**
  - High sustained bit rate (from 270Mb/s to 1,5Gb/s for SD & HD SDI compatibility on a single stream)
  - No dropped data

- **Time Predictability**
  - Low to medium latency (less than one frame)
  - Minimal and deterministic jitter (scale of tens of nanosecond)

- **Resource reservation**
  - Virtual dedicated channel
  - Real time guaranteed data delivery
  - Ordered data
  - Non duplicated and lost data (no retries)

- **Scalability**

- **Homogeneity**

- **Responsiveness**

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Challenges

- **Genlock**
  - Synchronization in frequency and phase of all connected devices from the cameras to the video switcher (scale of tens of nanosecond)

- **Virtual Audio/Video matrix**
  - Keep the availability:
    - to address each of the connected devices (e.g. camera and monitor, camera and switcher input, etc.),
    - to gather set of sources and destinations
    - to switch from one group to another in respect of synchronous event (e.g. frame basis).

- **QoS management**
  - Different priorities of dataflow: Simultaneous high bit rate streaming, system communication and data exchange sharing the same medium.
  - Dynamic and exhaustive view of the network's topology including connected devices

- **Wired and Wireless continuity**
  - Ensure the service's continuity between wired (Ethernet) and wireless (Ethernet over 802.16) parts.

- **Control and monitoring**
  - Provide a complete network supervision in accordance with the TV studio usage
  - Support current communication features (intercom, tally, etc.)

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