

# hr- Regionet

The new regional network for the interconnection of regional studios in Hessen

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## Content:

- Short description of the Hessischer Rundfunk (hr).
- Basic facts about old /new distribution and contribution structures.
- hr-Regionet: What, How and Why:
  - New topology, technological solutions
  - Basic concept, pros and cons
  - Future prospects.
- Management, QoS and security aspects
- Short tutorial on utilised technology

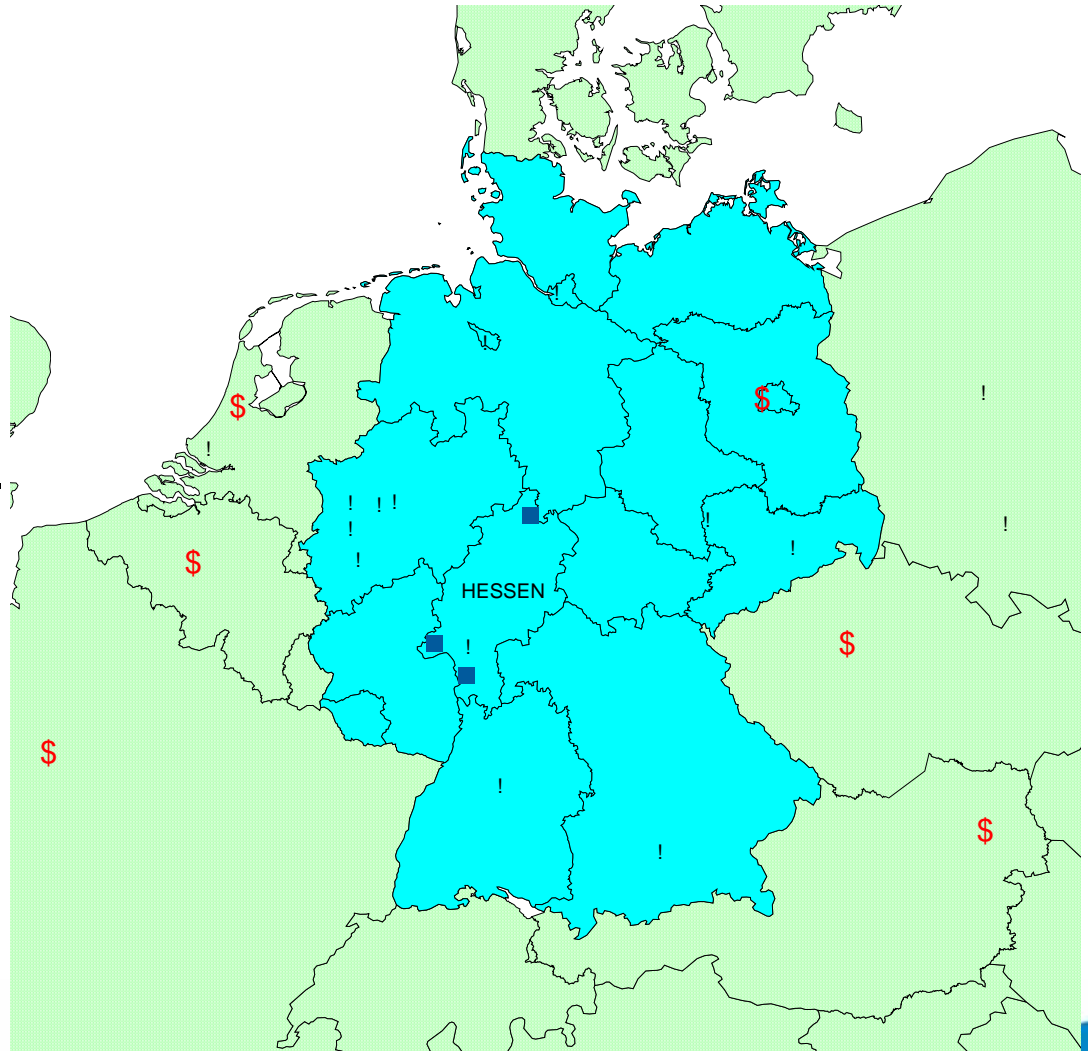
# Hessen in Germany and Europe

Hessen (Hesse):  
one of 16 german  
Länder (states).

Area: 21'100 km<sup>2</sup>,  
around 6 million inhabitants.

Capital city: Wiesbaden.

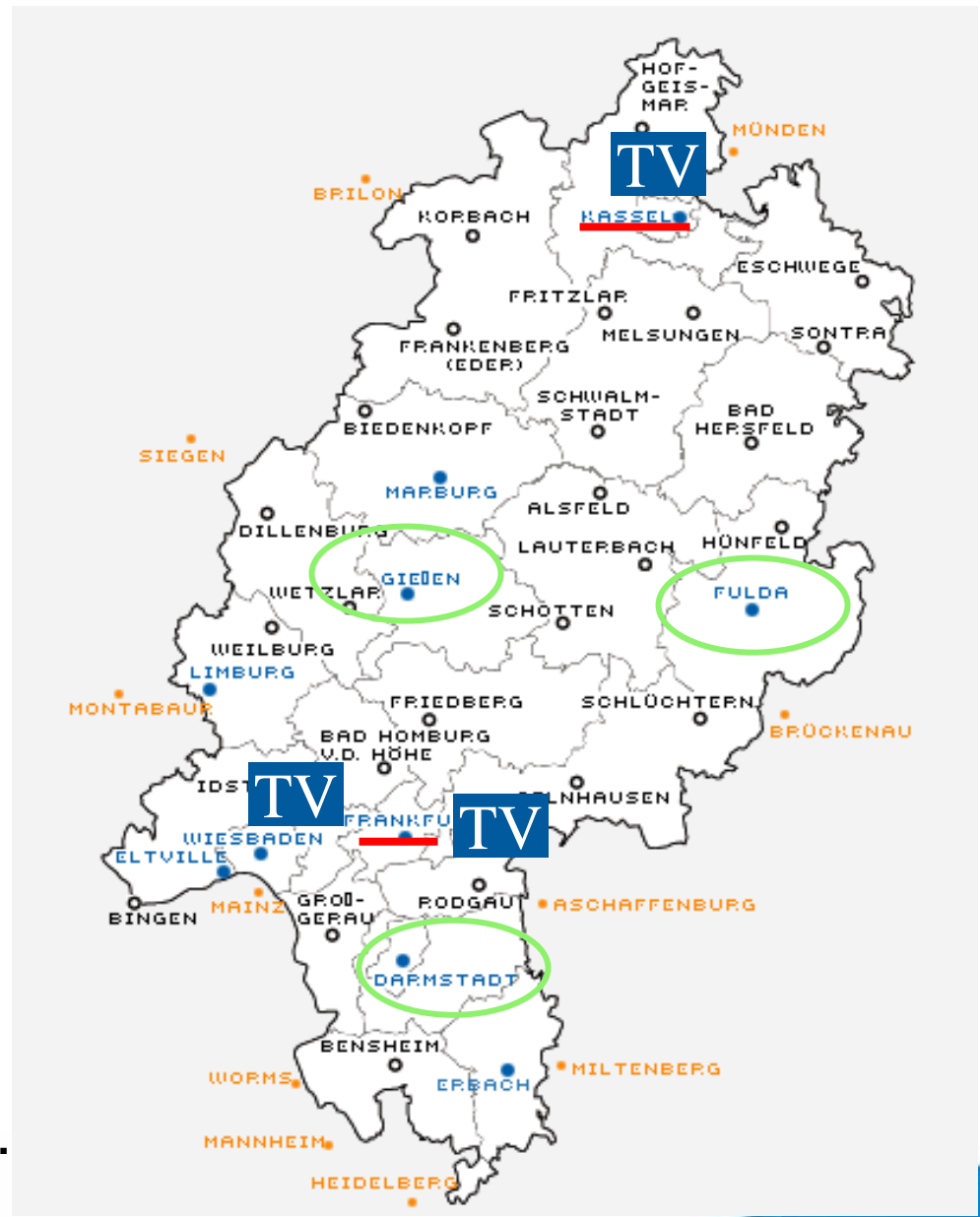
Largest cities:  
Frankfurt, Wiesbaden,  
Kassel, Darmstadt.



# Hessischer Rundfunk (hr):

Regional public broadcaster in Hessen,  
medium sized, member of the ARD:

- 6 +1-radio programs (6 FM, 1 AM),  
originating from 2 main locations,  
one of them is split into 4 regional  
parts three times a day.
- Regular contributions to the ARD  
program. One own, regional  
orientated TV program (hr-fernsehen).
- A total of 6 studio locations,  
3 of them with TV production facilities.
- 3-4 supplementary regional offices and  
several “home offices“,  
partly with “Video Journalist“-facilities.



# Hessischer Rundfunk: Transport Network, Status in 2005

- TV contribution and distribution network based on RuNet  
(both regional exchange circuits and links to the transmitters)
- Radio contribution via RuNet und ATM-BS  
Radio distribution via RuNet
  - the splitting of the regional programs is done in the regional studios
- Data services via VPN (ATM-BS and alternative carrier)
- Regional and “home offices“ connected over ISDN, E1 or xDSL

RuNet: „Common“-Network for Radio and TV-purpose operated by T-Systems International, Media & Broadcast (TSI)

ATM-BS: public ATM-Network (TSI)

VPN: Virtual Private Network

E1: 2Mbit/s SDH-link via RuNet

# Hessischer Rundfunk: Transport Network, New Structures

- Separation of contribution and distribution networks
- Splitting into two distinct networks:
  - “Peripheral“ network
  - “Core“ network.
- “Peripheral“ network: former distribution network
- “Core“ network: TV and radio contribution and internal data services

→ “Core“ network = [hr-Regionet](#)

## hr-Regionet: Why?

- New developments in the telecommunication market.
- New requirements due to digitalisation in broadcasting.
- Harmonisation of the existing different technical solutions.
- Create a uniform and flexible basic network infrastructure.
- DVB-T roll-off.
- Cost pressure.



## hr-Regionet: How?

Options: STM 16, Wavelength, Dark Fibre

Decision:

**Dark Fibre**

- Reasons:

- higher flexibility
- spare capacity
- price (only marginally higher than STM 16).

→ Solution: Combined lease/purchase model

- lease of Dark Fibre
- “hybrid“ technical concept
- purchase of the equipment
- assignment of operation and service

# hr-Regionet:

## Topology:

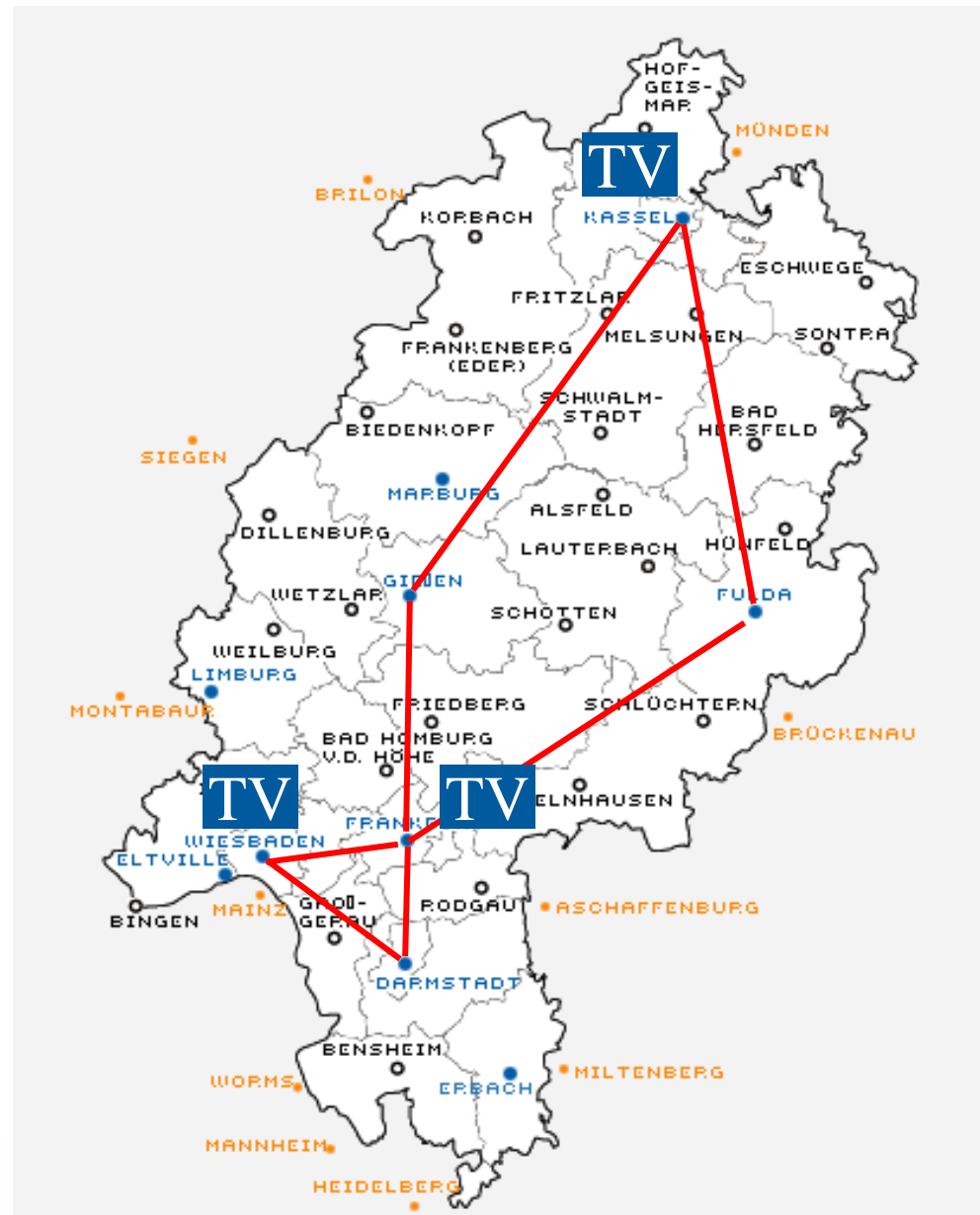
Two optical rings (Dark Fibre) connecting the 6 hr studios with cross-over node in Frankfurt.

## Basic Capacity:

4 x Lambda (4x 2,5Gbps),  
expandable to 8 x Lambda.  
(CWDM)

## Advantages:

- high flexibility
- simple enhancement
- high operational availability
- good utilisation of resources



# hr-Regionet: “List of Wishes”

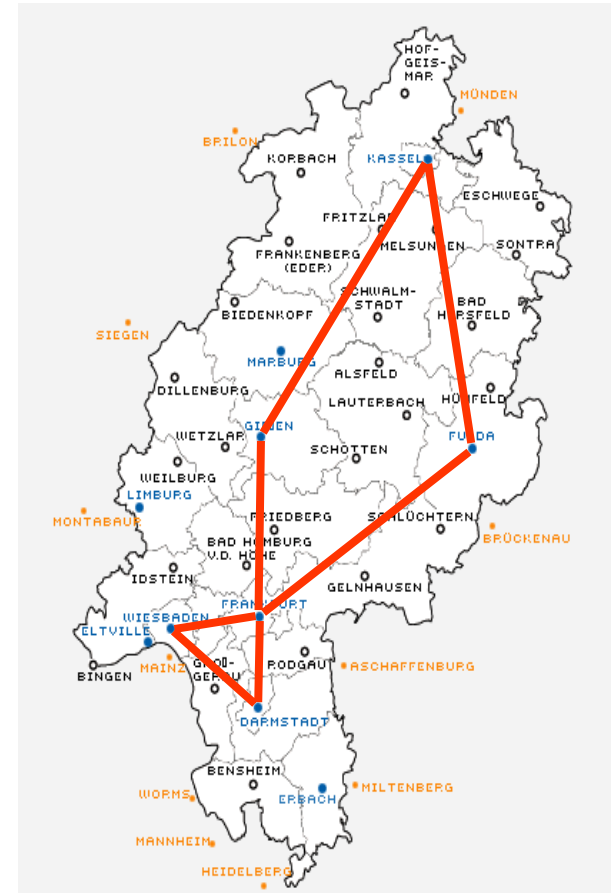
In every studio location the following services should be at least available:

- 4x Audio (AES/EBU) for radio purpose
- 1x Gb- Ethernet for production and office applications (DABS, Novell, AVID)
- 4x E1 (2Mbps) for voice applications

The basic requirement for TV studios in Kassel, Wiesbaden and Frankfurt was

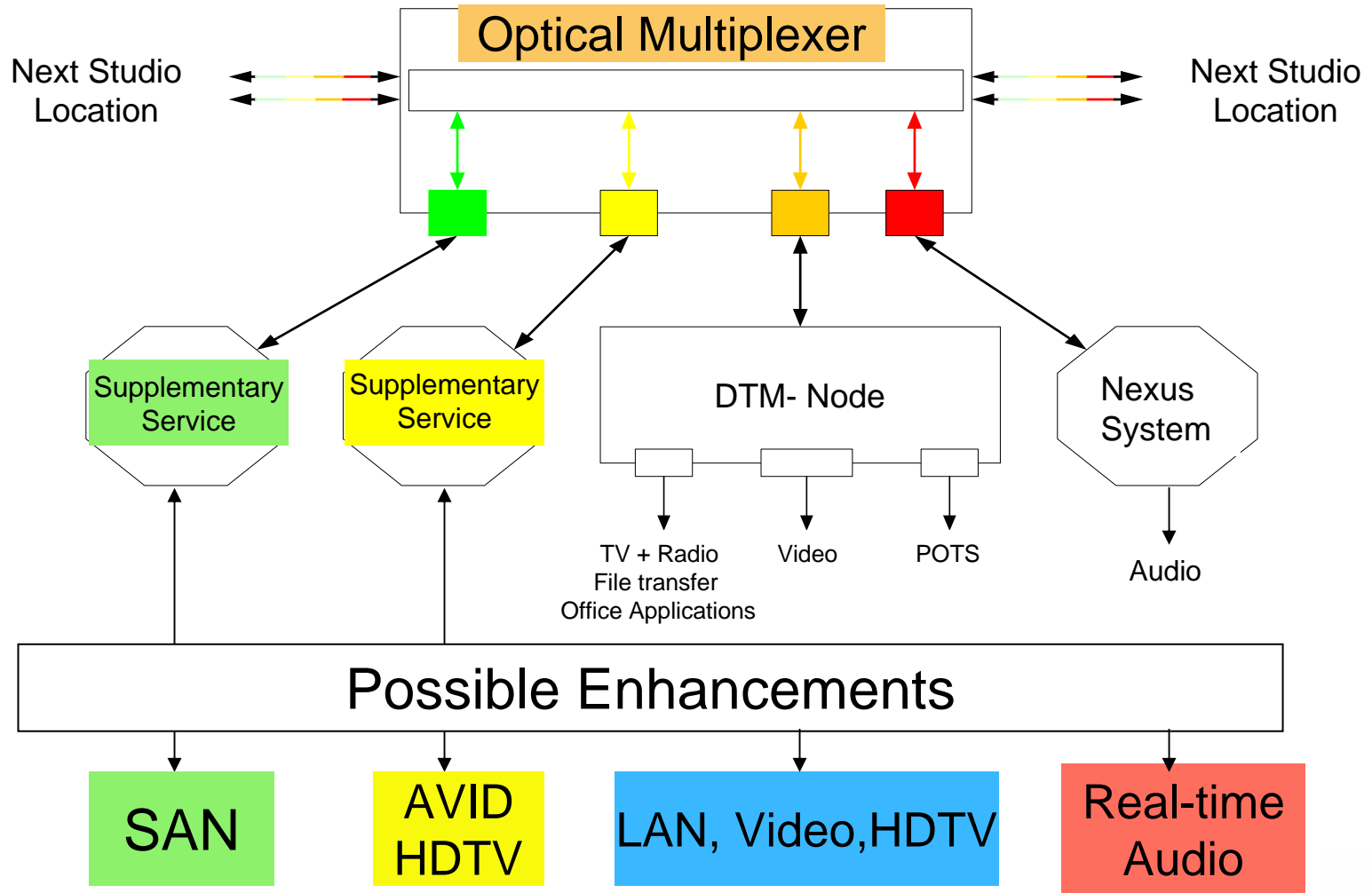
- 1x Video (SDI, 270Mbps), bi-directional.

Optional: ASI, and separate GbE for non linear applications



DABS: Radio Content & Management system

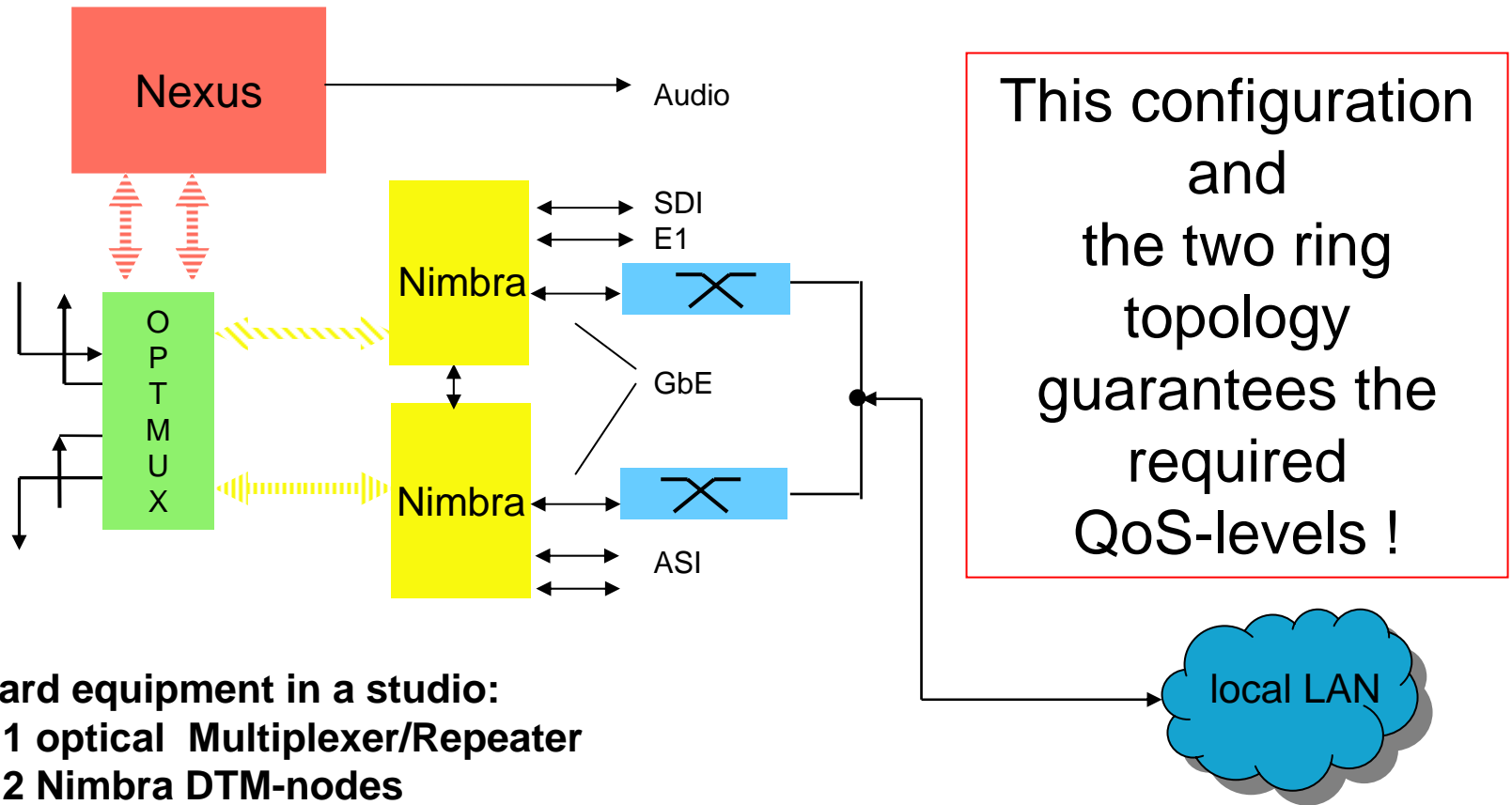
# hr-Regionet: Basic Technical Concept



# Advantages of the “Hybrid“ Concept on a Dark Fibre-Basis:

- Integration and continued use of existing systems and technology (NEXUS, SDI, POTS)
  - flexibility during migration
  - easy to integrate into existing structures and workflow.
- Nimbra™: implementation of a reliable, scalable multi-service platform, especially suitable and designed for broadcast applications.
- Modular design on all levels: CWDM, DTM, Nexus  
Easily scalable and adaptable to new requirements.
- Direct access to optical ports:  
New services and technologies easy to use or to integrate (Fibre-Channel, SAN-coupling)

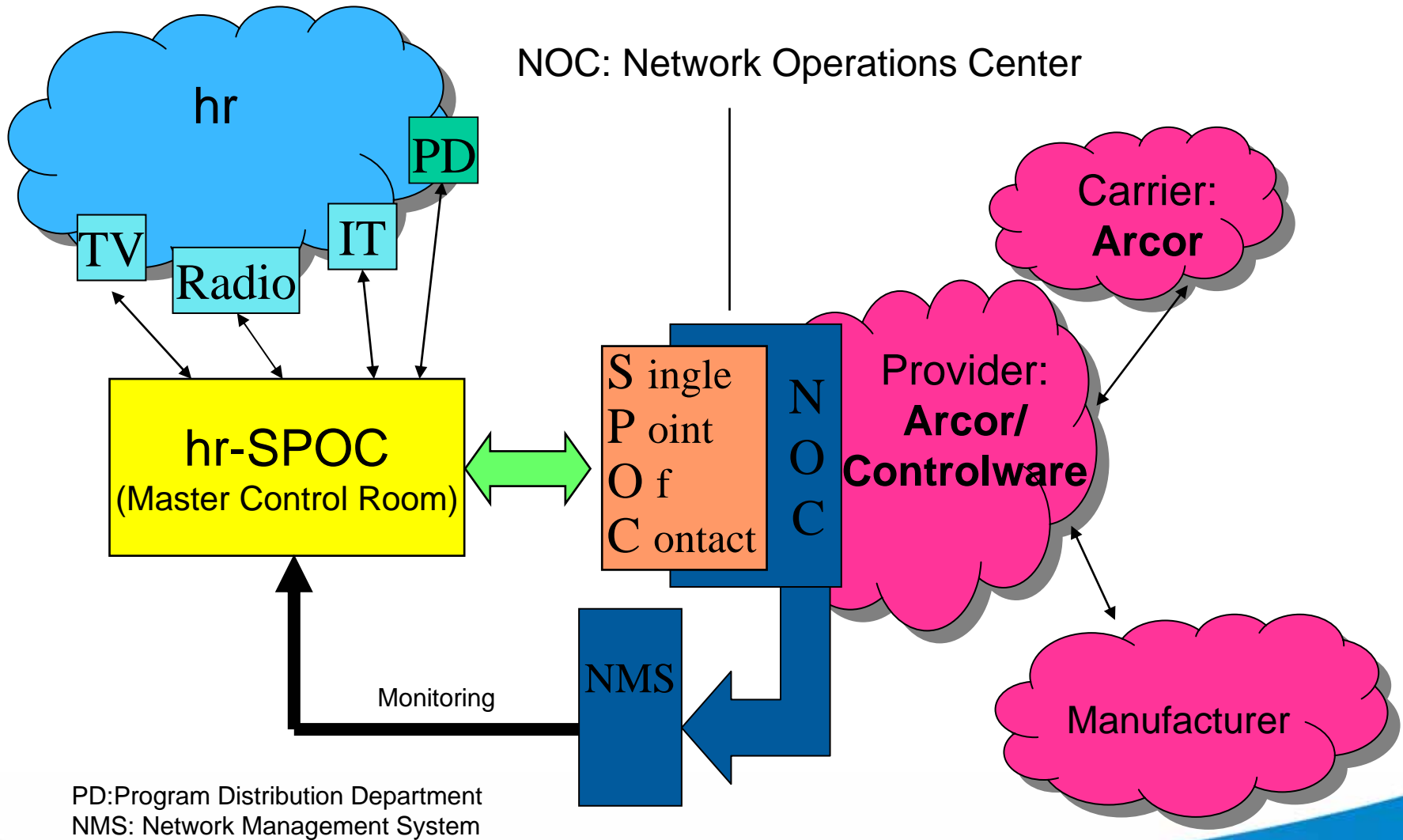
# hr- Regionet: Studio Equipment



## Standard equipment in a studio:

- 1 optical Multiplexer/Repeater
- 2 Nimbra DTM-nodes  
(Nimbra One or Nimbra 340, depending on the services)
- 2 Router/Switches for LAN-coupling
- 1 Nexus-Base Device for Real Time Audio purpose.

# hr-Regionet: Network management and operation



# Short tutorial: Nimbra, Nexus und DTM, what is it, and how does it work?



# Nexus-System

TDM-Bus based universal Audio-Matrix System,  
Manufacturer: Berlin based german company StageTec GmbH.

Mainly used in studio and campus environments.

- Internal resolution 30 Bit,
  - offers transparent handling and transmission of AES/EBU-signals with all supplementary data.
- Core elements are so-called “Base Devices“.
  - Processing and transport of up to 256 Mono-Signals,
  - all usual input and output formats are available.
- Use of optical fibre links between the “Base Devices“ enables complex network structures with a capacity of 128 mono signals.

TDM: Time Division Multiplex

# Nexus-System

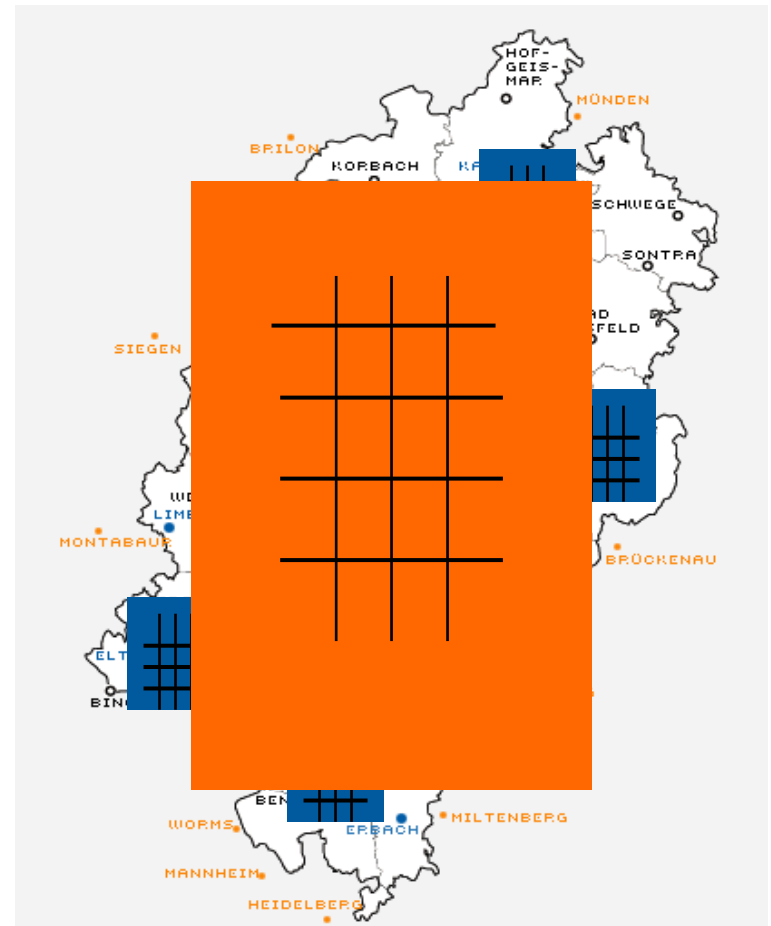
In the hr-Regionet the “Base Devices“in the regional studios are connected via their own lambda, forming a virtual single matrix for real-time audio signals.

## Advantages:

- No coding/decoding, flexibility,
- built-in redundancy, high reliability.
  
- Low Round Trip Delay e.g.:  
FFM - KS - FFM : 3.4 ms,  
FFM - GI - FFM : 2.0 ms

## But:

- Internal rerouting time up to 1s,  
“critical“ connections, e.g. for distribution  
need additional protection elements.



## Nimbra™ and DTM

Nimbra™ is the denomination for a DTM-based multi-service platform, mainly for broadcast environments.

- product of the Swedish Company Net Insight AB.
- It utilises the Net Insight proprietary DTM-technology
- Key features:
  - standardised interfaces for radio and TV applications (SDI, GbE, ASI, E1)  
    ➔no codecs !
  - optimised bandwidth management
  - guaranteed QoS
  - modular structure
  - flexibility on trunk side:
    - Nimbra can utilise dark fibre as well as SDH transport capacity,
- reliable and already utilised e.g. in EBU (FiNE), SVT, DR, WDR-Regionet and ARD-HYBNET.

# DTM: Dynamic synchronous Transfer Mode

- proprietary, connection orientated TDM (Time Division Multiplex)-process
- Net Insights own evolution of NG-SDH,
  
- it combines benefits of SDH and ATM
  - synchronous, low latency, guaranteed datarate
  - automatic rerouting, high QoS
  - point-to-point and point-to-multipoint connections
  - scalable, independent services in increments of 512 kbitps are possible
  - high efficient bandwidth utilisation.

## hr-Regionet: Time Table and First Experiences

The hr- Regionet was installed during spring and summer 2006. In october 2006 a first TV link between Kassel and Frankfurt was operational, the migration of the radio circuits into the new network was completed end of may 2007.

The migration and integration of the existing systems succeeded without noteworthy troubles.

The network is very stable. Up to now no “real“ failures, only a few, marginal problems, mainly with the SDI-services.

Thank You for Your Attention!

Questions?

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