DFN
Deutsches Forschungsnetz

# DFN and the LHC network requirements

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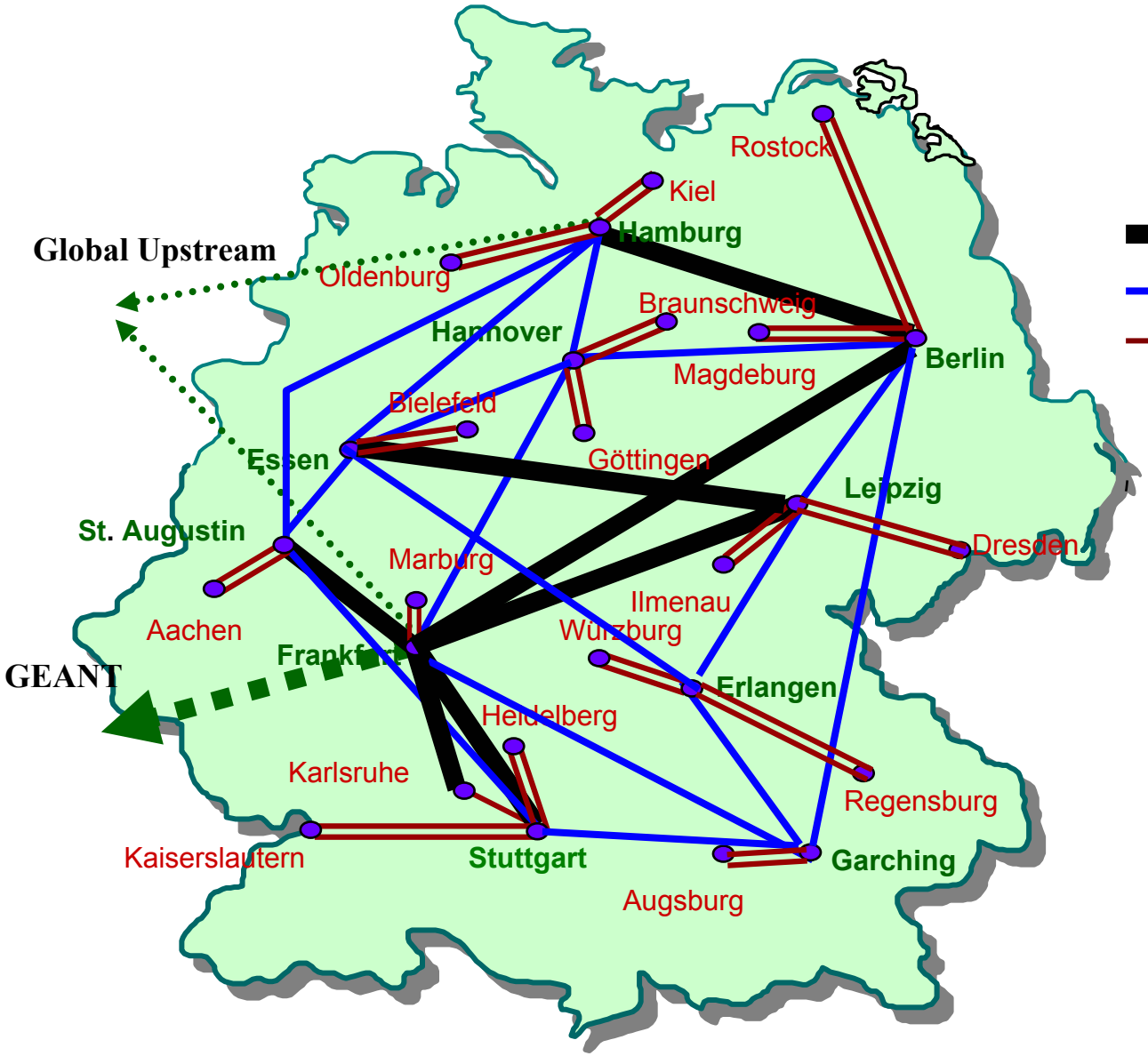
# Situation today

- Core network
  - 27 nodes operated by DFN
  - SDH transparent wavelength
  - links with 2,5 and 10 G SDH Interfaces
  - 24/7 Control by service provider
- Contract
  - one contract with Carrier (T-Systems)
    - provision and control of all links
    - operational responsibility secured via binding SLAs
  - finishes end of 2005

# Logical Topology G-WiN




27 nodes
10 Gbit/s
2,4 Gbit/s
2,4 Gbit/s

as of 15.03.2004

# Concepts for new core network

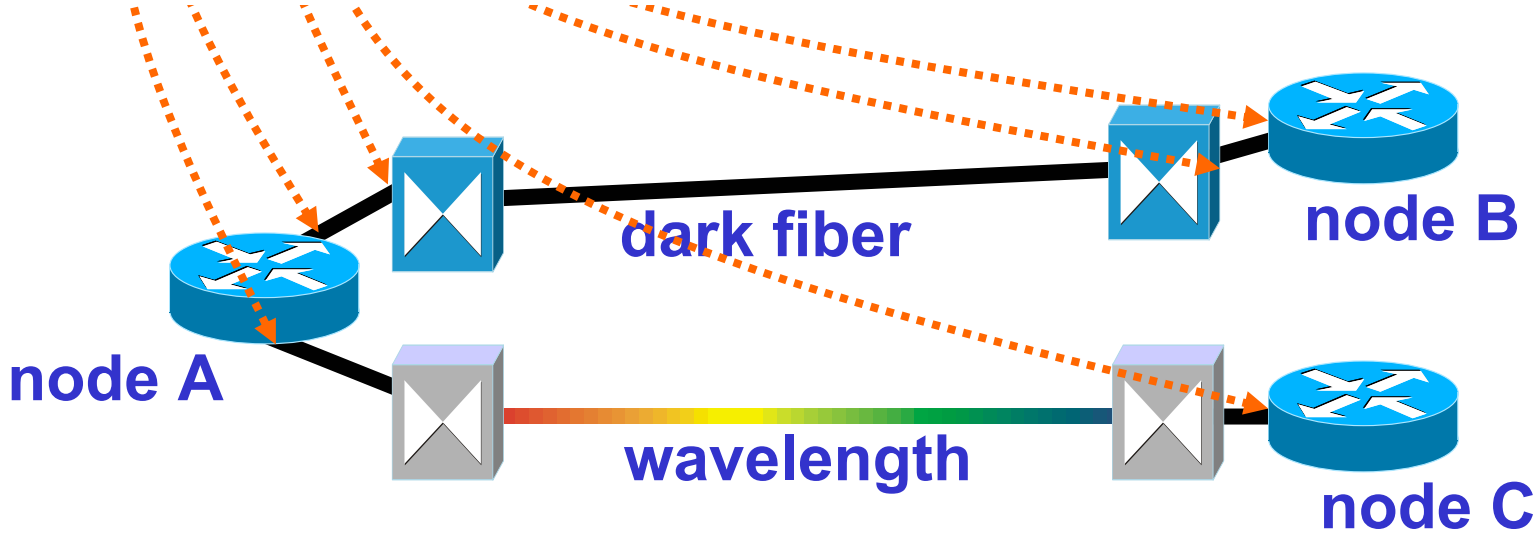
- Technical concept
  - dark fiber and wavelengths as optical platform
  - more nodes
- Economic concept
  - (re-)define core network via package of services
  - make possible to establish more than one provider

# New operational model

Supervisor

alarms and supervises support
(i.e. for links, equipment)

Access to management
data of DFN equipment



# Dark fiber

- Technical definition
  - ITU-T conform and "WDM-compatible"
- Service:
  - 24/7 hotline and debug
  - provision of colocation rooms
  - (fibre) end-to-end responsibility with provider
  - usual reaction time in case of failures (SLAs)
  - integration into DFN defined processes

# Equipment for dark fiber

- Technical definition:
  - provision of digital interfaces plus DWDM equipment
  - provision of a management system
- Service:
  - inclusive installation and maintenance
  - 24/7 hotline and debug
  - usual reaction time in case of failures
  - integration into DFN defined processes

# Wavelengths

- Technical definition:
  - several digital protocols up to 10 Gbit/s
  - change of digital protocol should be possible
    - fast in the framework of usual replacement times
    - economic in the sense of usual interface costs
- Service:
  - 24/7 hotline and debug, usual times for reaction
  - integration into DFN defined processes
  - usual SLAs

# Operation

- Tasks to be done:
  - Supervision of management data
  - Well defined procedures for operation
    - Identification of failures (equipment? - links?)
    - alarm of respective support unit
    - supervision of debug process
    - triggering escalation, if necessary
  - Procedures DFN defined
  - Monthly reporting
  - Open for integration of new equipment

# Tendering Process

- Europe wide call in 2004, starting with a long market evaluation in 2003
- No negotiation procedure, i.e. with call the following items have been already definined :
  - minimal requirements, informations to be provided, evaluation scheme, all contracts
- Decision November 2004
- Topology Design finishes at 02/05
- Start migration G-WiN --> X-WiN 07/05
- Start operation until end 2005

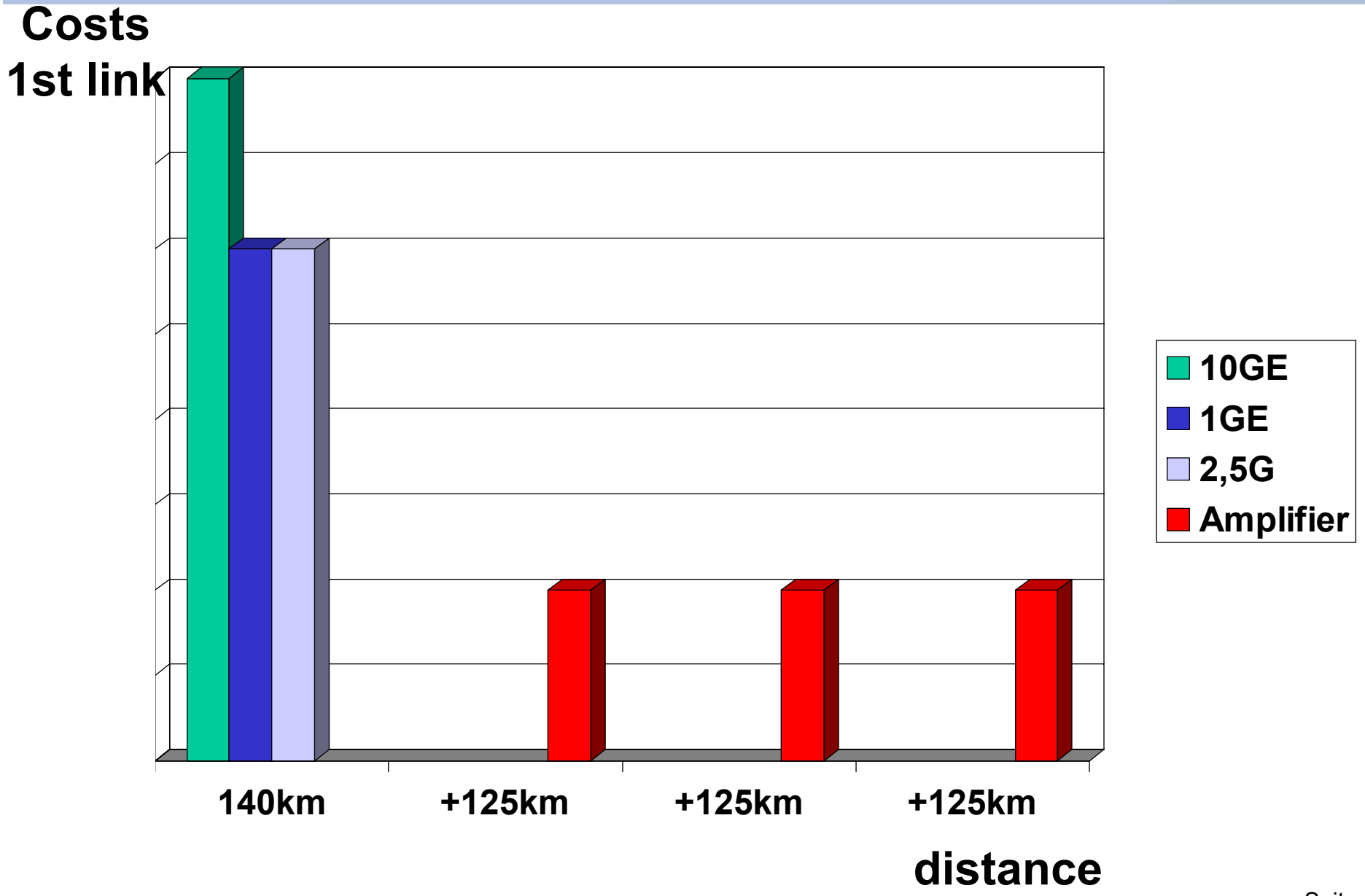
# Main Results

- Most of the X-WiN core will be a fibre network (see map), the rest will be provided by wavelengths
- several fibre and wavelengths providers
- fibre is relatively cheap - in most cases (!) more economic than (one) wavelength
- future network creates many new options besides being cheaper than the G-WiN core

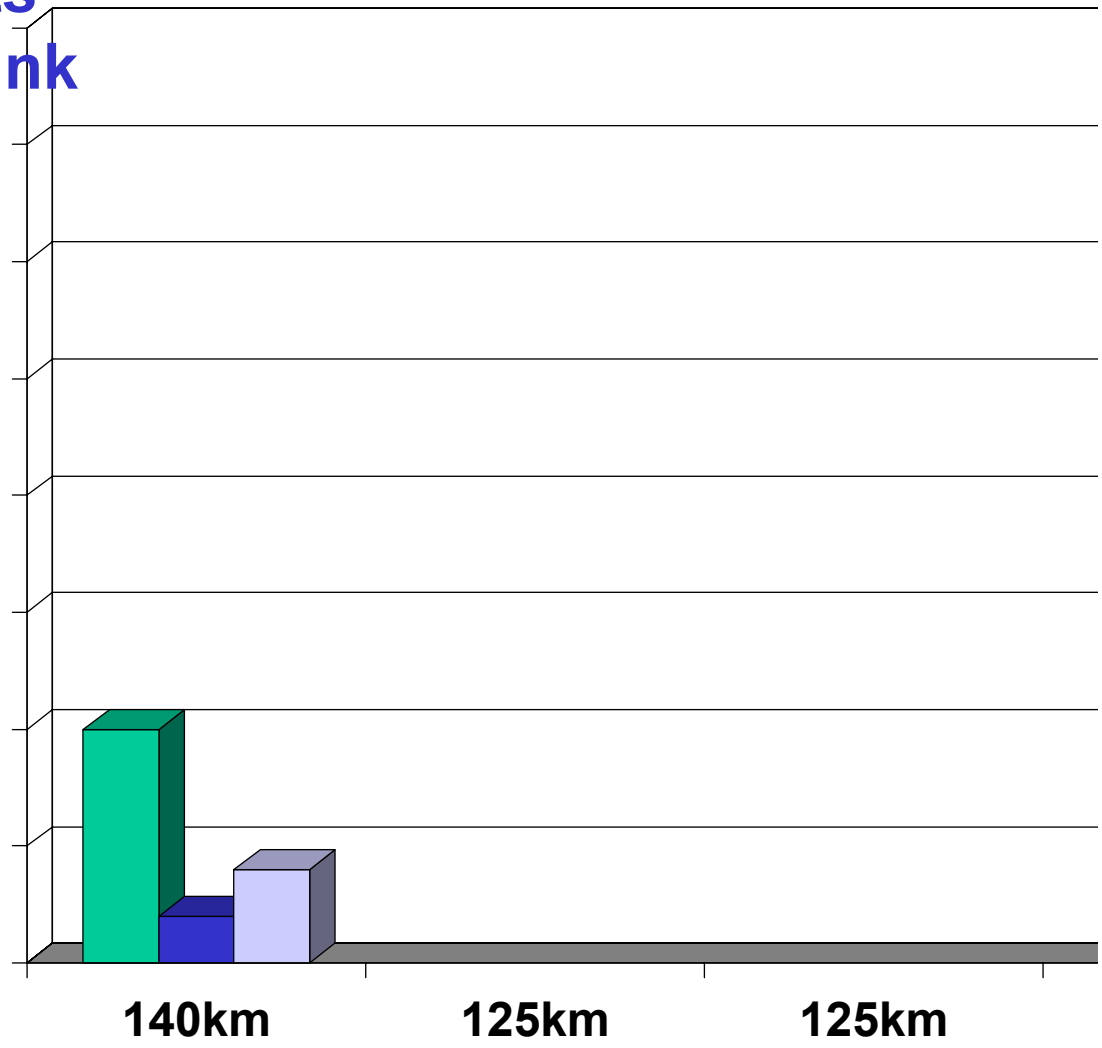
# Economy of fibre links (1)

- 1st link is relatively expensive - will be used for Internet traffic
- n-th link (n>1) is cheap and will enable cheap VPN constructs

# Economy of fibre links (2)



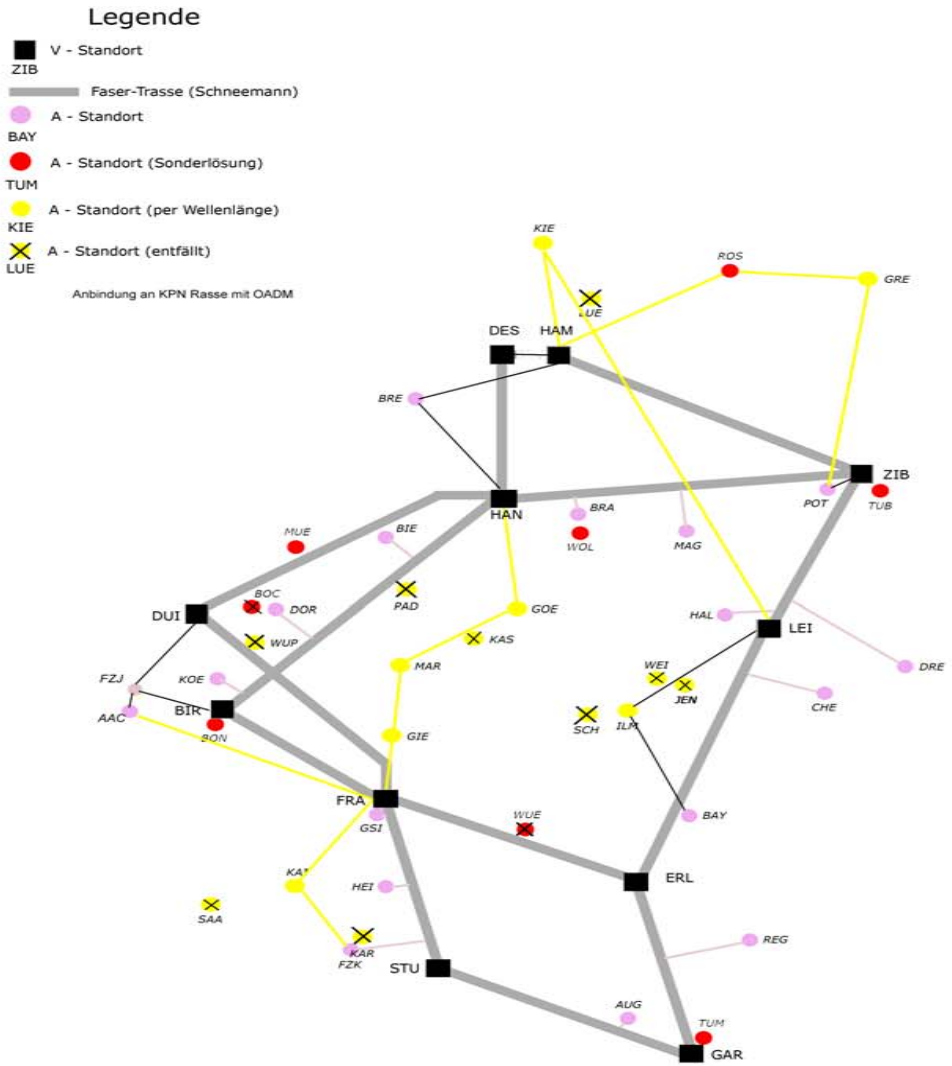
# Costs 2nd link



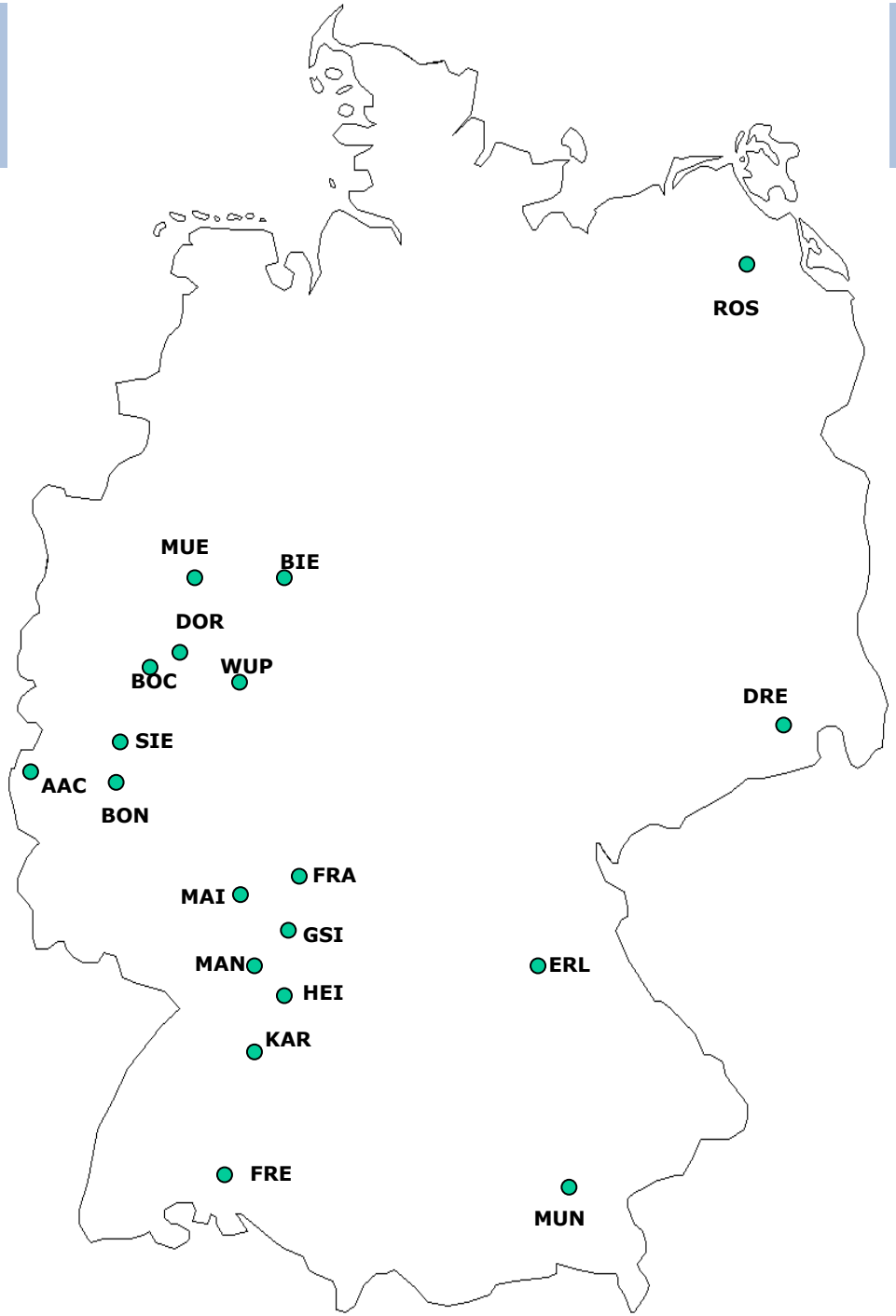

10GE
1GE
2,5G

# KPN fibre in DE

# Possible configuration for X-WiN



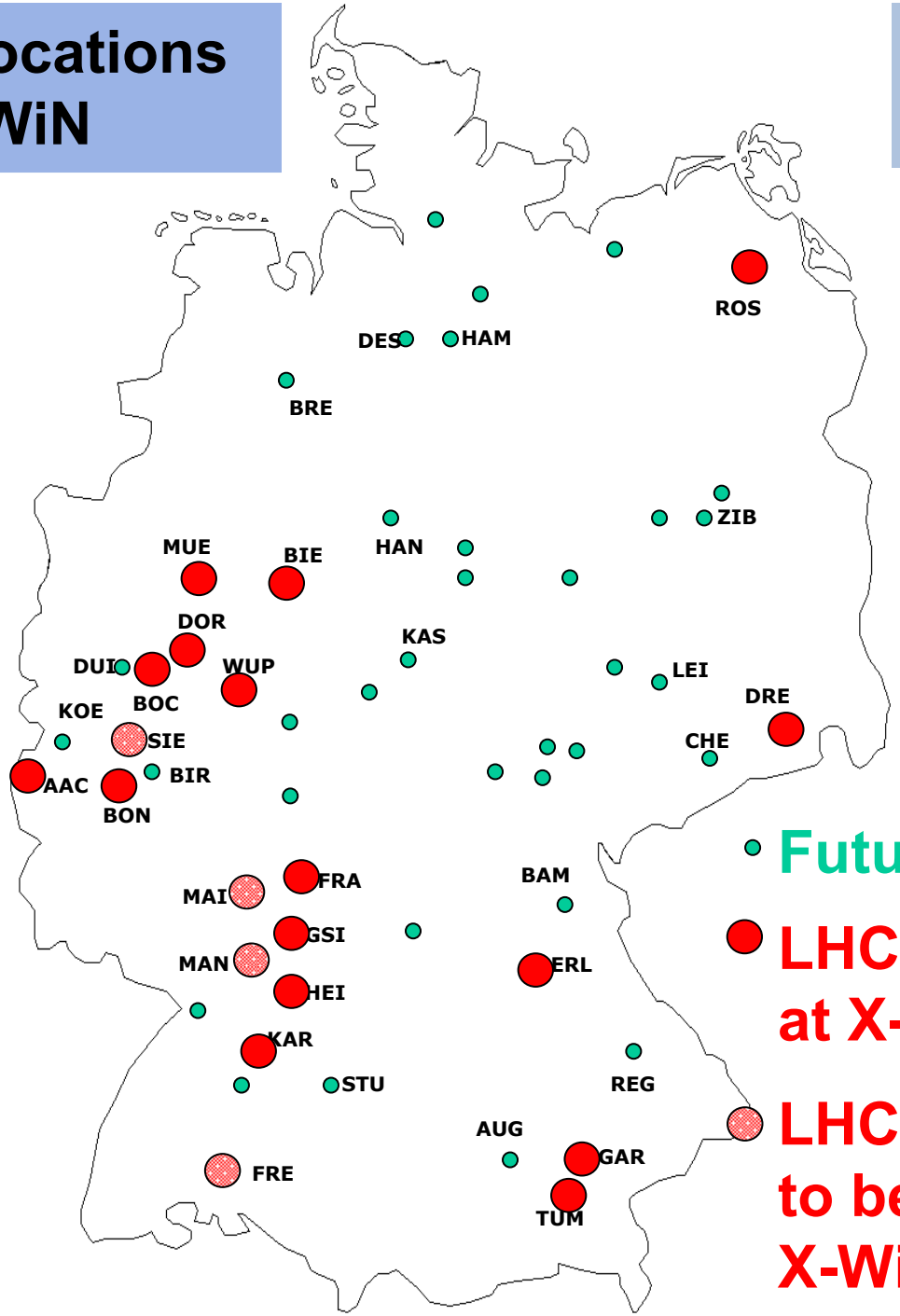
# LHC user locations in Germany



# LHC network services in DE

- T0-T1 problem
  - 10 Gbit/s access on a European VPN from GridKa to CERN
- T1-T2 problem
  - within DE no problem as most LHC sites are close to an X-WiN node (see map)
  - for T1 and T2 outside DE rough estimate of data flows needed - but no problem in principle with X-WiN and Geant infrastructure

# LHC User Locations and X-WiN




- Future X-WiN-Nodes
- LHC User Locations at X-WiN-Nodes
- LHC User locations to be connected to X-WiN nodes