

NDGF Tier-1 Network

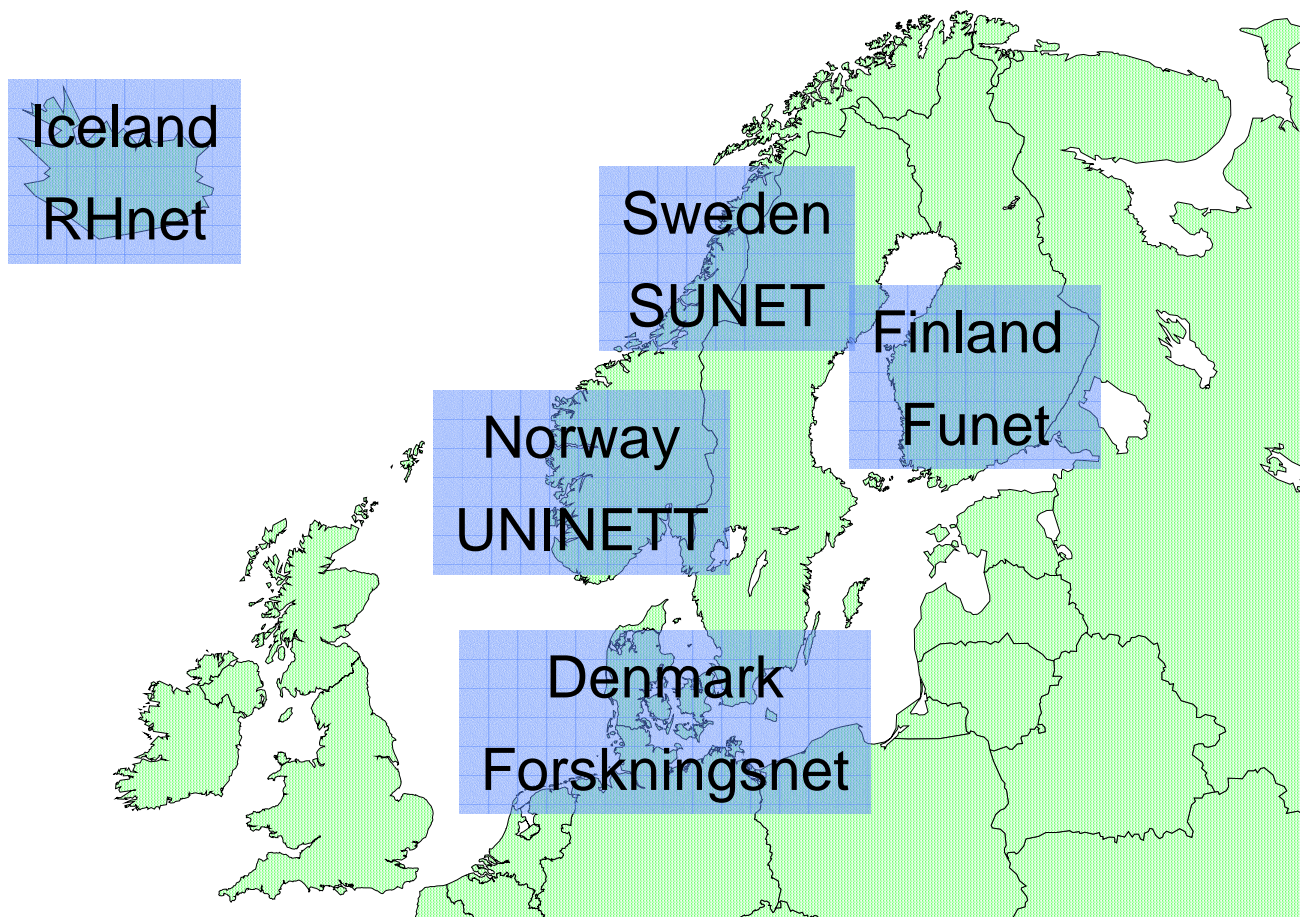
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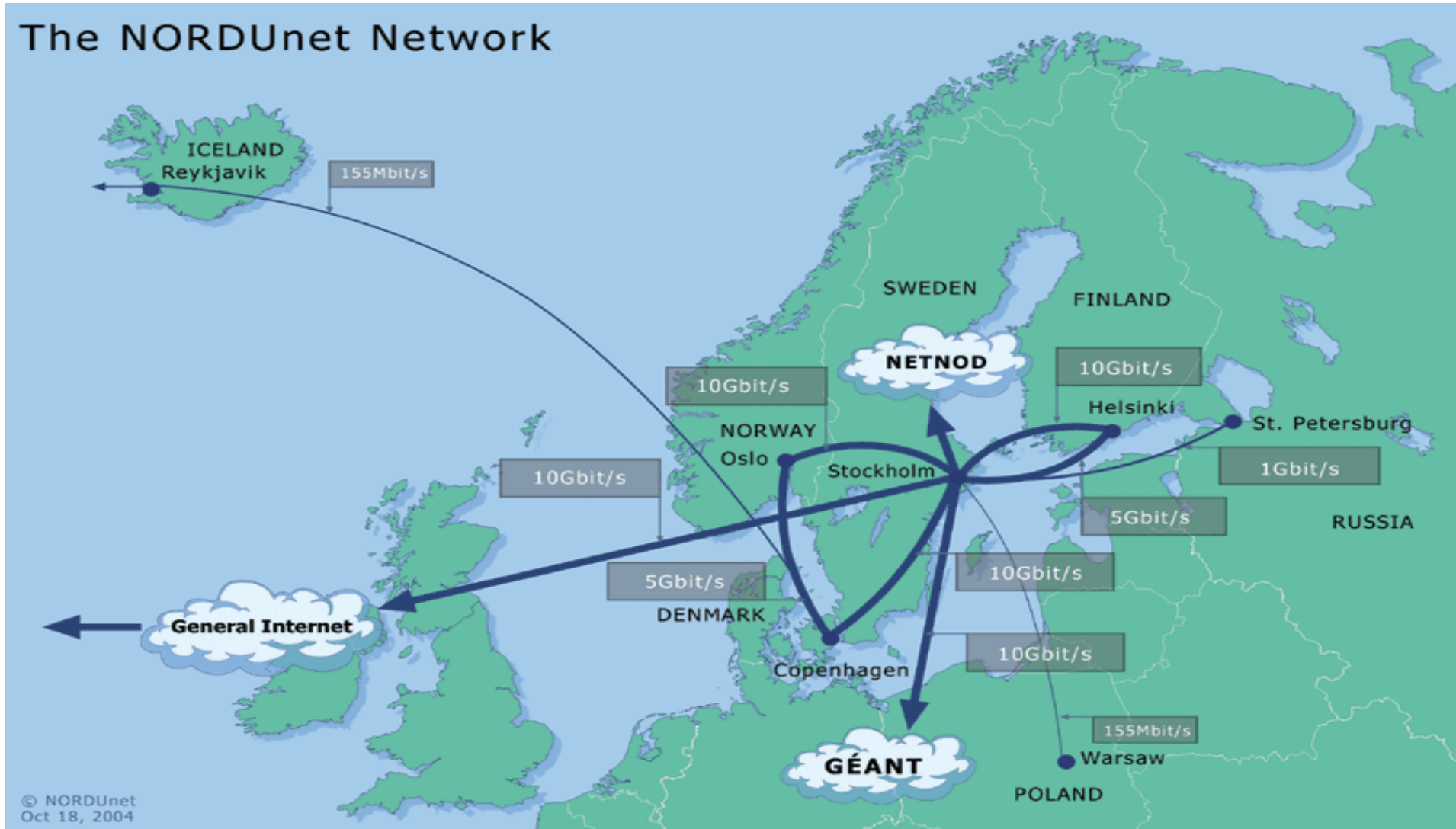
T0 / T1 Network Meeting

Rome, 4 April 2006

NORDUnet



NORDUnet IP network



Nordic Dark Fiber Network

- **NORDUnet Fiber-core currently being installed**
 - Connecting Copenhagen, Oslo, Helsinki, Stockholm, diverse routes
 - Contract for fiber signed
 - DWDM & SDH / SONET tender ongoing
 - Live Q3-06
- **Services**
 - OC-48 / OC-192 / 1 GE / 10 GE
- **Interconnects**
 - GEANT2 Interconnect in Copenhagen (from go-live)
 - Nordic NREN interconnects (Sweden from go-live)
 - Cross-border fiber: Hamburg (DFN & SURFnet) in Q4
- **NREN Fiber-cores networks for Nordic countries in progress**
 - SUNET (Sweden) fiber and equipment signed; go-live Q2/Q3-06
 - Finland, Denmark, Norway: In planning

NDGF – Nordic Data Grid Facility

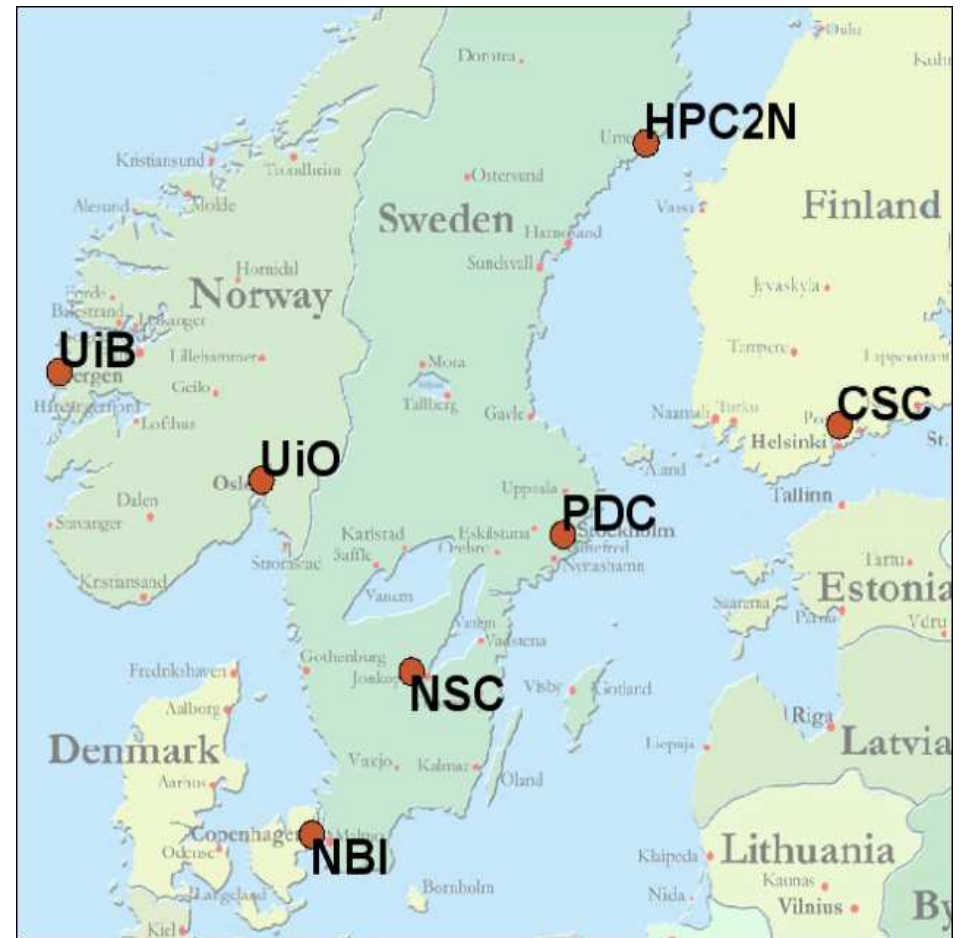
- A Co-operative Nordic grid facility
 - Nordic production grid, leveraging national grid resources
 - Operate Nordic storage facility for major projects
 - Create policy framework for Nordic production grid
 - Nordic planning and coordination
 - Co-ordinate & host major grid projects (i.e., Nordic LHC Tier-1)
 - Develop grid middleware
- NDGF 2006-2010
 - Builds on NorduGrid project
 - Two-year pilot completed, five-year funding secured
 - Strategic planning ongoing; integration with NORDUnet plans
 - General grid facility - not just for HEP

NDGF LHC Tier-1

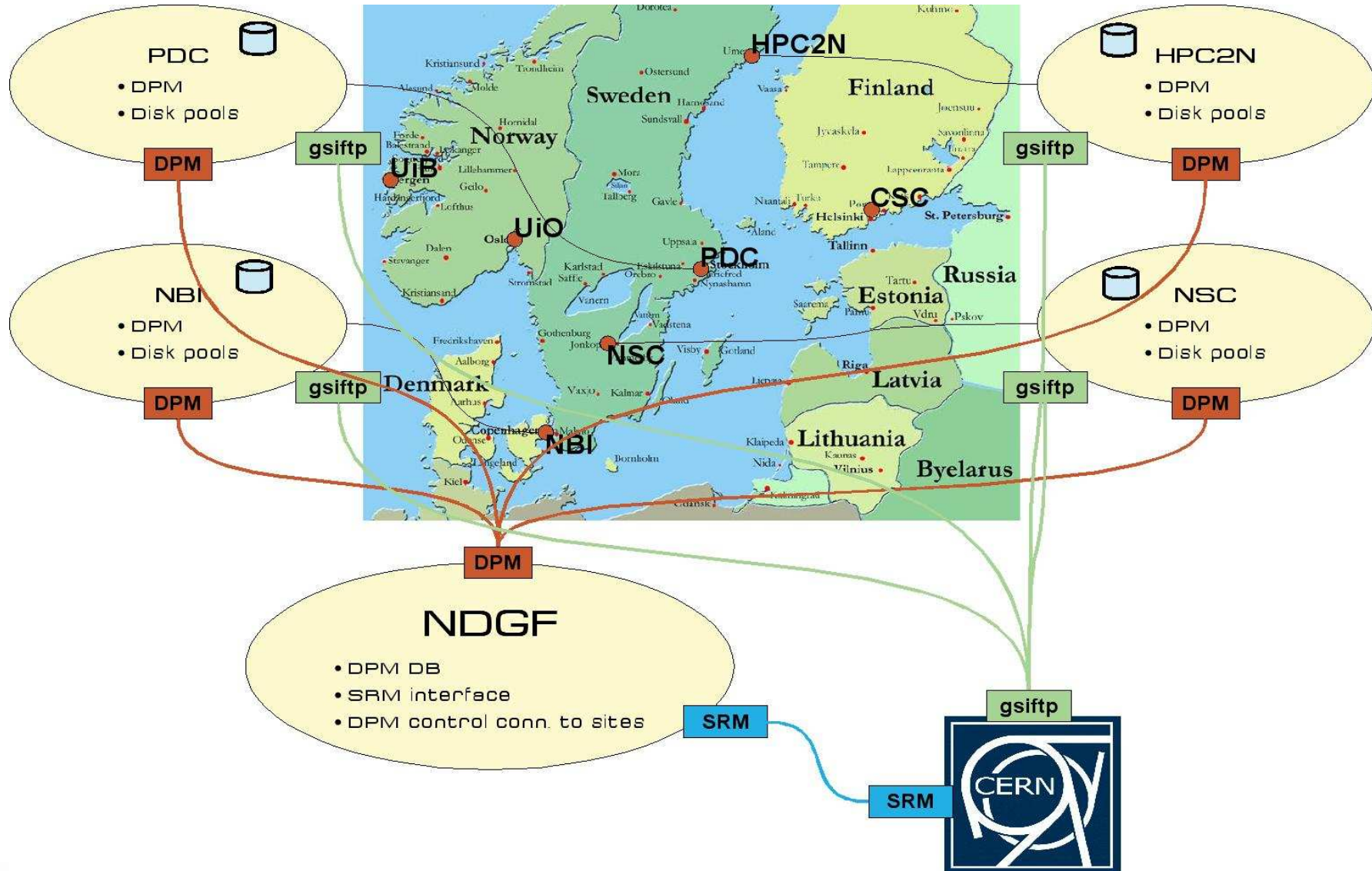
- NDGF will
 - host the Nordic LHC Tier-1
 - co-ordinate network, storage, and computing resources
 - co-ordinate towards CERN and LHC project partners
- NDGF creates *one technical facility to host the Tier-1*
 - NDGF Tier-1 Network, connecting to CERN (via GEANT2) and to participating sites
 - NDGF Tier-1 computing infrastructure, employing national grid resources
 - NDGF Tier-1 storage infrastructure, deployed at national supercomputing centres
- We are special - MoU: 3.3.1 & 3:
 - A Tier1 Centre may (exceptionally) comprise a federation of computer centres.
 - ...they are indistinguishable in all respects from single sites...

NDGF Tier-1 Sites

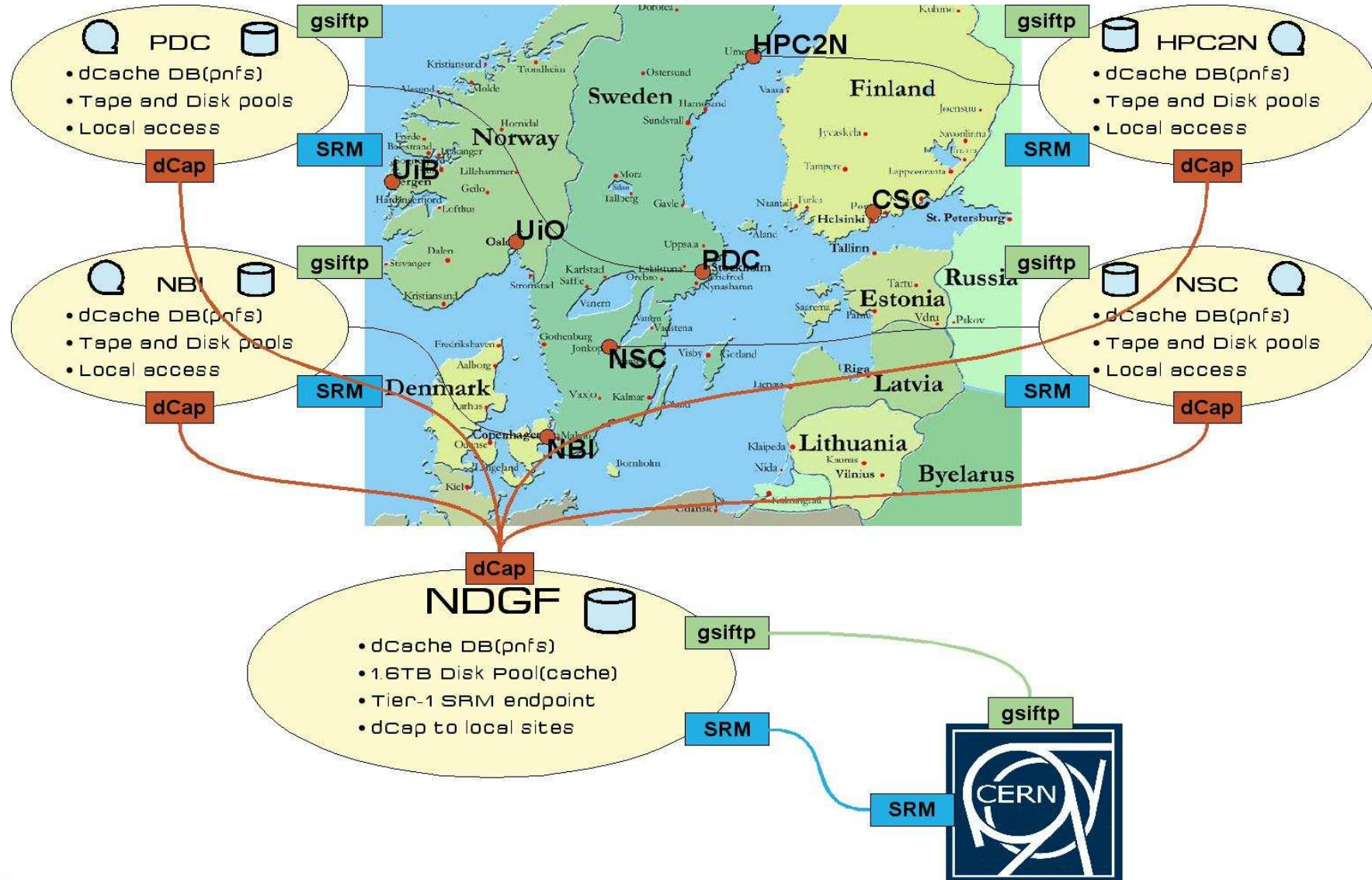
- Appears as a Single Site
- Has one interface towards CERN (One SRM endpoint)
- The Storage is distributed
- The Computing Ressources are distributed - like most other T1
- Has Storage and Computing Ressources attached to a "longreach" LAN
- Most ressources run NorduGrid / ARC
- LCG-ARC interoperability, ALICE ARC-VOBOX, ATLAS ARC-DDM



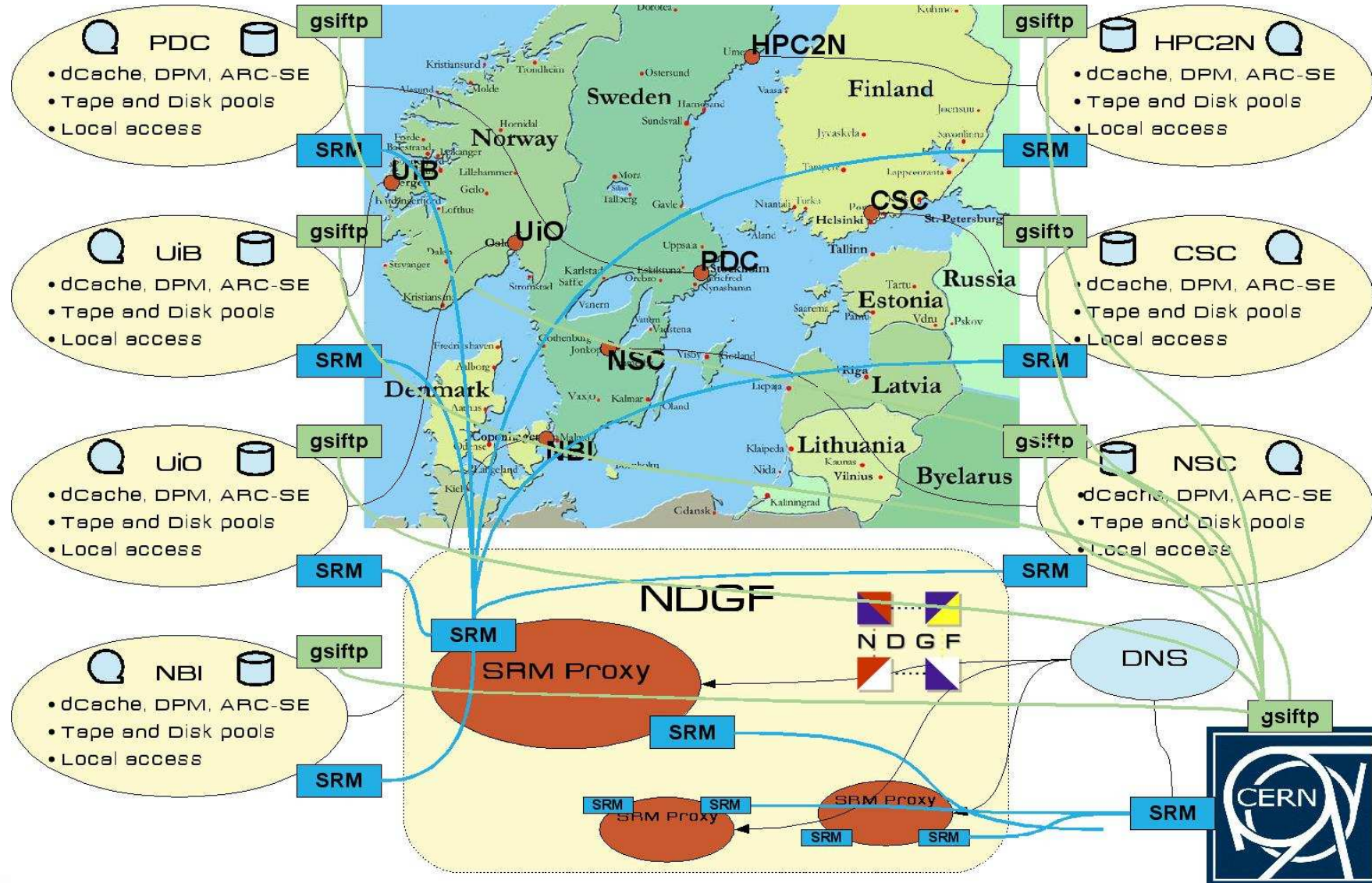
Storage setup for NDGF Tier-1 - SC3



Storage setup for NDGF Tier-1 - SC4



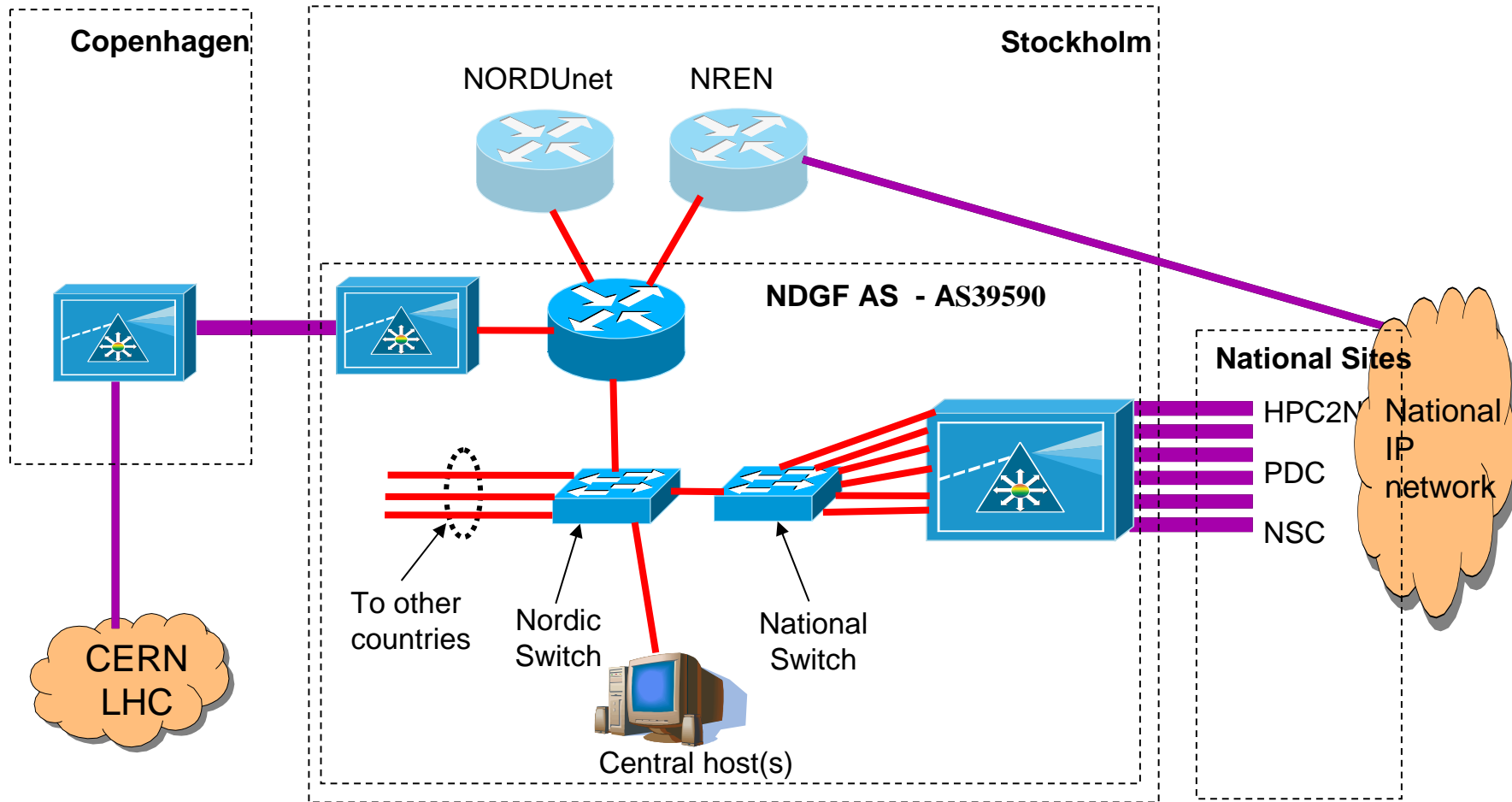
Storage setup for NDGF Tier-1 - LHC



Storage setup for NDGF Tier-1

- All sites run their own, independent storage systems with
 - SC4: dCap Interface towards NDGF
 - LHC: SRM Interface towards NDGF (gsiftp towards T0)
- The central service is kept to a minimum:
 - SC4: dCache installation with disk-cache using sites as 3rd storage
 - LHC: SRM Proxies at several sites, DNS round-robin
- The distributed nature promises a high uptime
 - Any site can be down 50% and still data can be written to NDGF 99% of the time

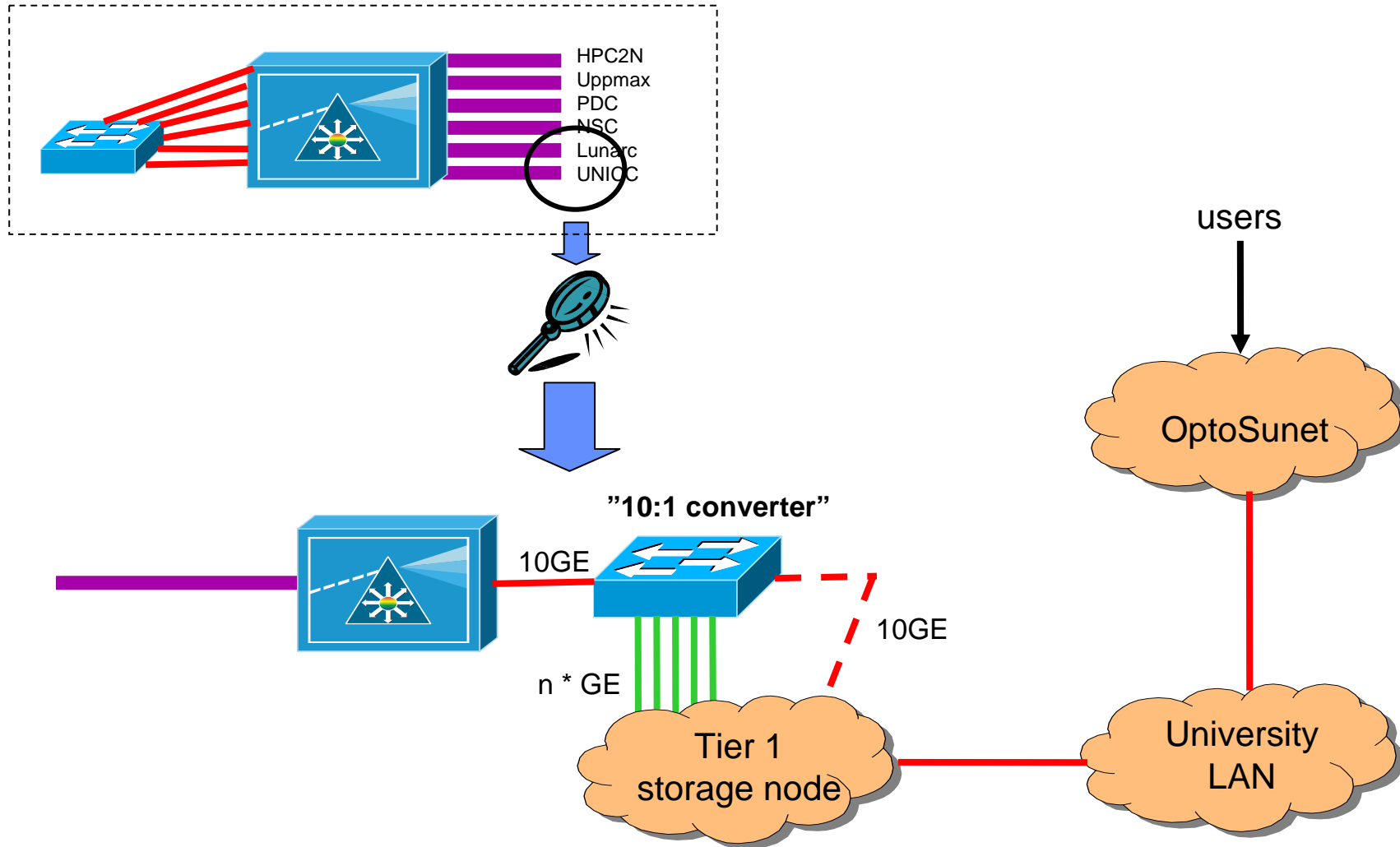
NDGF Tier-1 OPN



NDGF Tier-1 OPN - details

- Star Network, center in Stockholm
- Interface to LHC OPN at GEANT2 PoP in Copenhagen
- Possible Tier-1 - Tier-1 links from Copenhagen, using CBF
- Will provide one IP network, with peering with LHC OPN, NORDUnet IP, Nordic NREN IP.
 - Will use AS39590 (ownership: ORG-NDGF1-RIPE)
 - Will announce NDGF IP-range
- Outside access to NDGF Tier-1 resources through IP peering
- Inside NDGF Tier-1 will appear as one LAN
 - Connect all participating sites
 - Provide inter-Tier-1 access to computing and storage resources
 - Will create one virtual site from participating national sites
- Layered LAN approach, one switch per country (where needed)

NDGF Tier-1 Site Network



NDGF Tier-1 Site details

- Each site to connect directly to NDGF Tier-1 OPN w/10 GE
- Each site to deploy 10 GE / 1 GE switching infrastructure for NDGF resources
- Storage resources and computing resources to connect
 - To NDGF LAN only (dedicated)
 - To NDGF and Campus LAN (multi-homing)
- Primary outside access to storage and computing resources to be through IP peering with NORDUnet and Nordic NRENs
- Resources to connect using 10 GE or (more typical) multiple bonded 1 GE links

NDGF Tier-1 Roadmap

- Storage & Computing Resources:

- March: Setup distributed dCache and coordinate with experiments
- April: Perform T0->T1 disk-disk and disk tapetests at 50MB/sec sustained (SC4)
- May: Install production services (LFC, 3D, VOBOX/DDM) tune dCache
- June: SC4

- Network

- March: use backup shared-IP network
- April / May: Install 10G circuit to CERN and terminate, terminate in NORDUnet router for bridging to shared-IP network, announce NDGF AS
- Summer 06: Install NDGF OPN equipment
- Q3 06: Provision 10G circuits for NDGF OPN

NDGF Ressource Management

Network Management by NORDUnet NOC

- Integrated with NORDUnet IP Network Management & NORDUnet Fiber / DWDM Network Management
- One operations support system, one ticketing system
- Tier-1 Storage & Computing Ressources managed by NDGF
 - Integrated with NDGF Production Grid management
 - Integrated with NDGF Support system, ticketing system
 - NDGF to have dedicated LHC project manager
- Individual Storage and Computing Ressources managed by participating sites
 - NDGF-dedicated available at sites
- NDGF & NORDUnet organisations tightly integrated.

Questions?

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