

Funet Dark Fiber status

NORDUnet seminar, March 2007

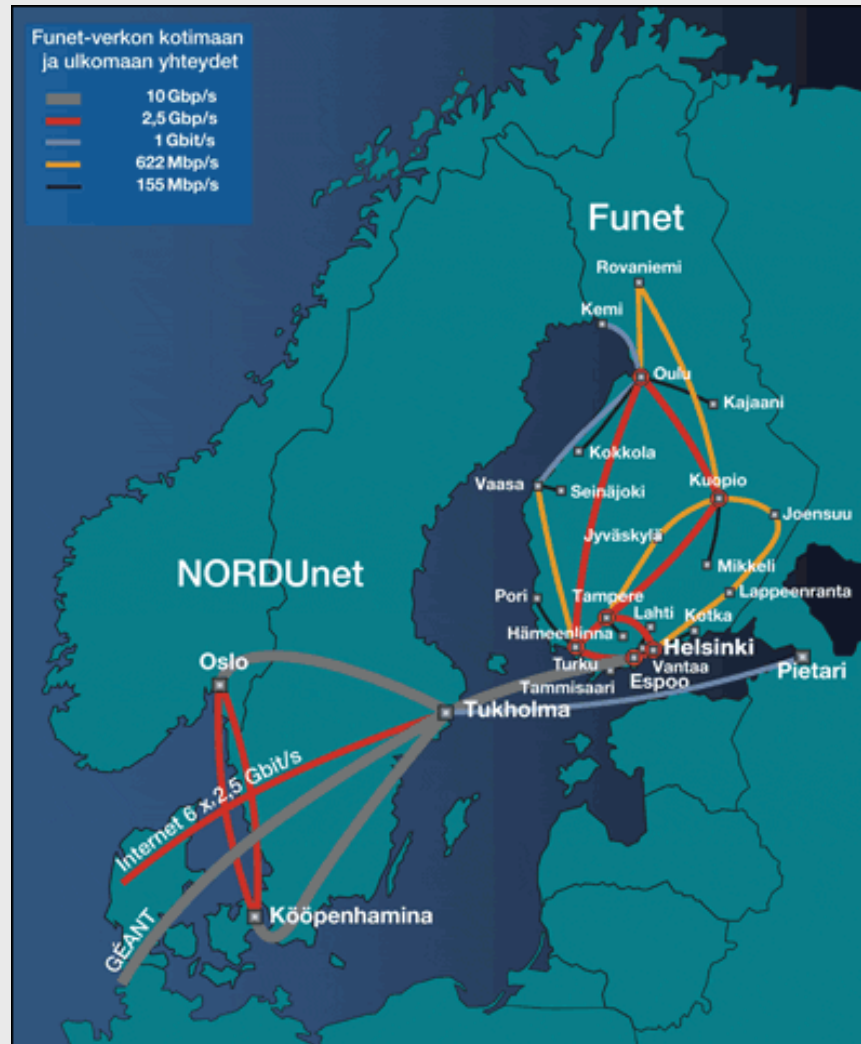
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Current Funet router network



- **Juniper routers**
 - T320/M20/M10
 - IPv4/IPv6 dual stack "pure IP" network (no MPLS)
- **Transmission capacity**
 - 2,5Gps / 1Gbps / 622Mbps (155Mbps)
 - Providers: TeliaSonera (65%) Corenet (35%)
 - Agreements run until September, 2007 (with extension options, per link)
- **Access 1Gbps / 155 Mbps / 100Mbps**
 - Metsähovi 10G pilot connection since July, 2006
 - Mostly metropolitan dark fiber links
- **External connectivity**
 - Nordunet 10+2x2,5 Gbps
 - Ficix 2 x 1Gbps (10G soon)

International lambda applications in Funet

➤ **DEISA/eDEISA**

- DEISA connects European supercomputers
- Politically important (national / European level)
 - First 10G connections exist already
 - CSC ready around April with new Cray
 - **NORDUnet availability and pricing info needed**

➤ **Radio astronomy**

- Metsähovi: JIVE/eVLBN/EXpRESS/...

➤ **CERN LHC activities**

- NDGF, LHC related organizations



National lambda activities/applications

➤ **Test traffic**

- Network R&D organizations
- NORDUnet partners, EU projects?

➤ **Centralized/decentralized IT services**

- Standard "campus ICT" infrastructure and tools
 - Fiber channel, Ethernet, VPNs, ...
- Special applications like raw digital video



Funet2007 requirements

➤ **Topology**

- Similar geography as in current Funet (20 towns, 80 org.)
- Diverse (fiber) connections to all (major) locations
- Flexible future changes in locations and topology

➤ **Technology**

- Possibility for multiple 10G connections between major PoPs
- Possibility for multiple sub-10G connections between all PoPs
- Upgrade roadmap to 40G/100G connections
- (Layer 3 on top of L1/L2 service; initially using current hardware)

➤ **Services**

- 24/7 error detection (and, when necessary, escalation)
- Installing and maintenance services
- Fast and flexible provisioning of connections

➤ **Administration**

- Well defined cost structure (including changes)
- Lifetime of 8..15 years



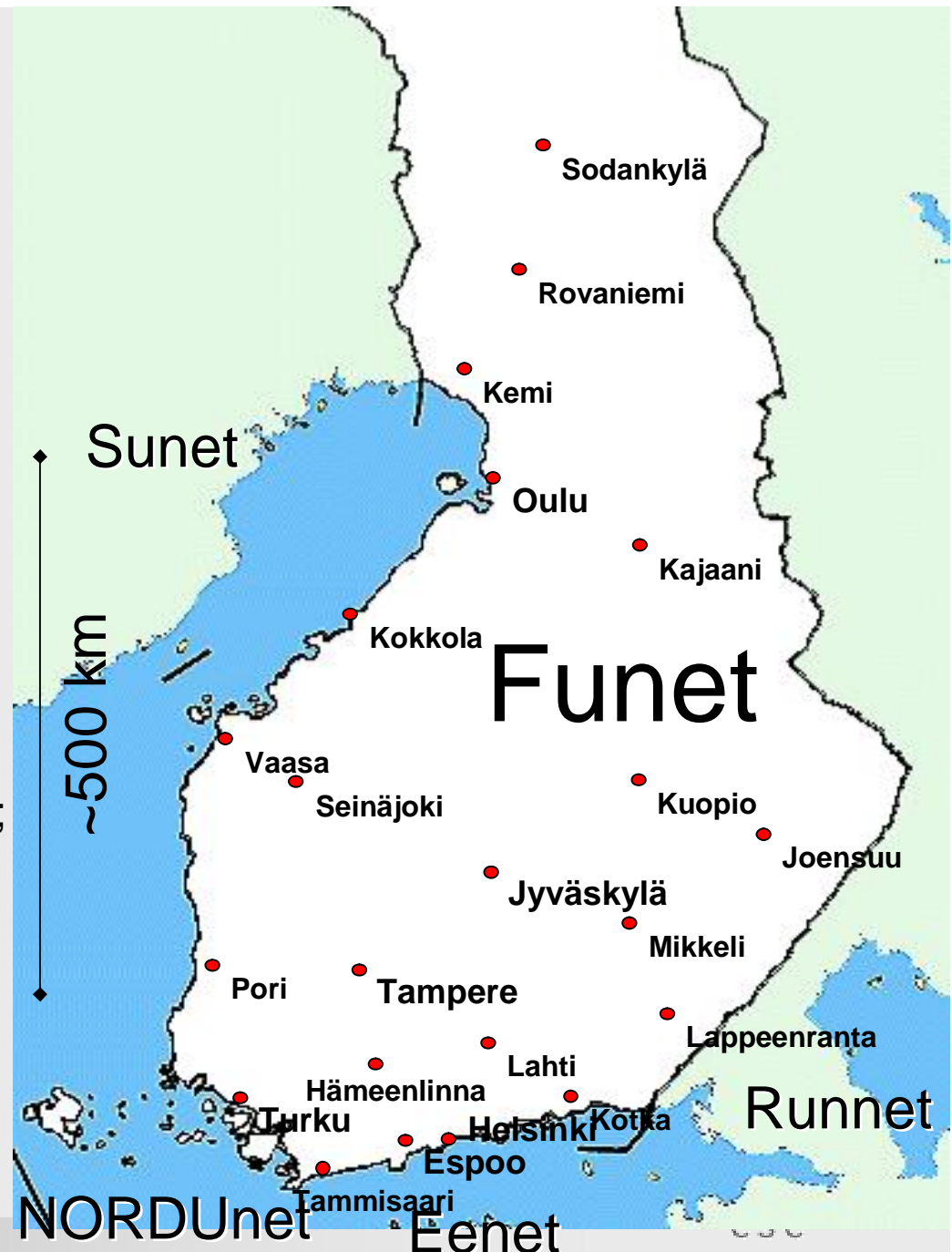
Funet topology

➤ Overall topology

- 20+ towns
- PoP locations typically at a university campus
- Spans: 80..300 km
- Sketch topology of about 4500 km for DWDM vendors

➤ Cross-border availability

- Sweden: aware of lambda possibility between Vaasa-Umeå; fiber available from Kemi via Tornio (towards Luleå)
- Russia/Gloriad(?): "available to Russian border, exclusively for academic use"
- Estonia: available



Dark Fiber Procurement

➤ **4 candidates**

- Deadline Dec 21st 2006
- Open procedure (!)
- Tenders valid until Sep 30, 2007

➤ **Geographical coverage in Finland**

- Available to all university/polytechnic towns
- Sketch topology ca. 4500 km
- Final topology "iterated" with DWDM vendors



Fiber Pricing and Type

➤ Pricing

- True competition in some (not all) areas

➤ Only G.652 fiber offered

- Mostly relatively new fiber offered
 - Situation differs between providers
 - Some towns/areas problematic, but developing (?)
- Difficult to get specifications and other facts
 - "NK Cables/Draka FYOVD2PMU"



PMD "considered harmful"

- **Providers: "PMD = 0,2 ps/√km"**
 - even "0,5 ps/√km" quoted (from specs)
 - "PMD is no issue" (with 10G)
 - 40G not considered?
- **CSC: PMD_{coeff} 0.03—0.06 ps/√km**
 - Data from two spans (60+90 km), one pair
 - Fiber (assumed to be) installed during 2001
- **Can we assume better than 0,2 ps/√km?**
 - Clearly, more data needed before decisions
 - Is there a "NORDUnet standard"? Procedures?



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Equipment tender

- **Process started in February**
 - A number of interested vendors (or other parties)
- **Procedure**
 - Requests for participation (deadline March 30th)
 - Shortlisting (April)
 - Negotiations (April-May?): ***detailed nw planning***
 - Final call for tender (May-June?)
- **Things to be negotiated**
 - Hardware characteristics, roadmaps, technology...
 - Fiber topology and roll-out considerations
 - Support services (next slide)
 - Pricing



Services (TBS)

	Hardware vendor	Service org.	CSC NORDUnet
HW/SW support	involved	?	
Spare part service	Involved	?	
Installation service	no?	likely	no
Monitoring tools	?	?	?
24/7 Monitoring fault detection escalation		?	?
DWDM planning, provisioning, documentation, expertise	?	?	?



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Draft Timetable

- **Preparation and preliminary planning (done)**
 - Specifications and planning drafts
 - Contacts with interested companies
- **Procurement phase winter/spring 2006/2007**
 - Fibers: open procedure
 - Hardware (and services) *to start in February*
 - Agreements June 2007 ?
- **Implementation 4Q 2007-**
 - Phase 1 Production Oct-Dec 2007
 - Phasing details to be specified



Financing and budget

- **Total budget calculated and communicated in earlier stage**
 - Covering equipment, fibers/transmission and services
 - Depends on calculation/estimation methods for router consolidation etc.
- **Financing**
 - About 1M€ confirmed/allocated in June 2006
 - must use by end of 2007
 - Further financing to be confirmed in 2007 for 2008?
 - must take administrative and operational precautions
- **Lambda pricing model**
 - To be agreed in 4Q2007, effective 1Q2008 (or later?)



Funet2007 - a fine balance between

- **Academic network neighborhood/interoperability**
- **Immediate and projected customer need**
- **Available and future technology**
- **Available fiber infrastructure and services**
- **Geography (topology)**
- **Budget (guesses!)**
- **Service level requirements**
- **Flexibility**
- **KISS**



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