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EUROPEAN PARLIAMENT

*Scientific Technology
Options Assessment*

STOA

Computer networks for research and education:

A European success story – New challenges for policy makers



April 2, 2008

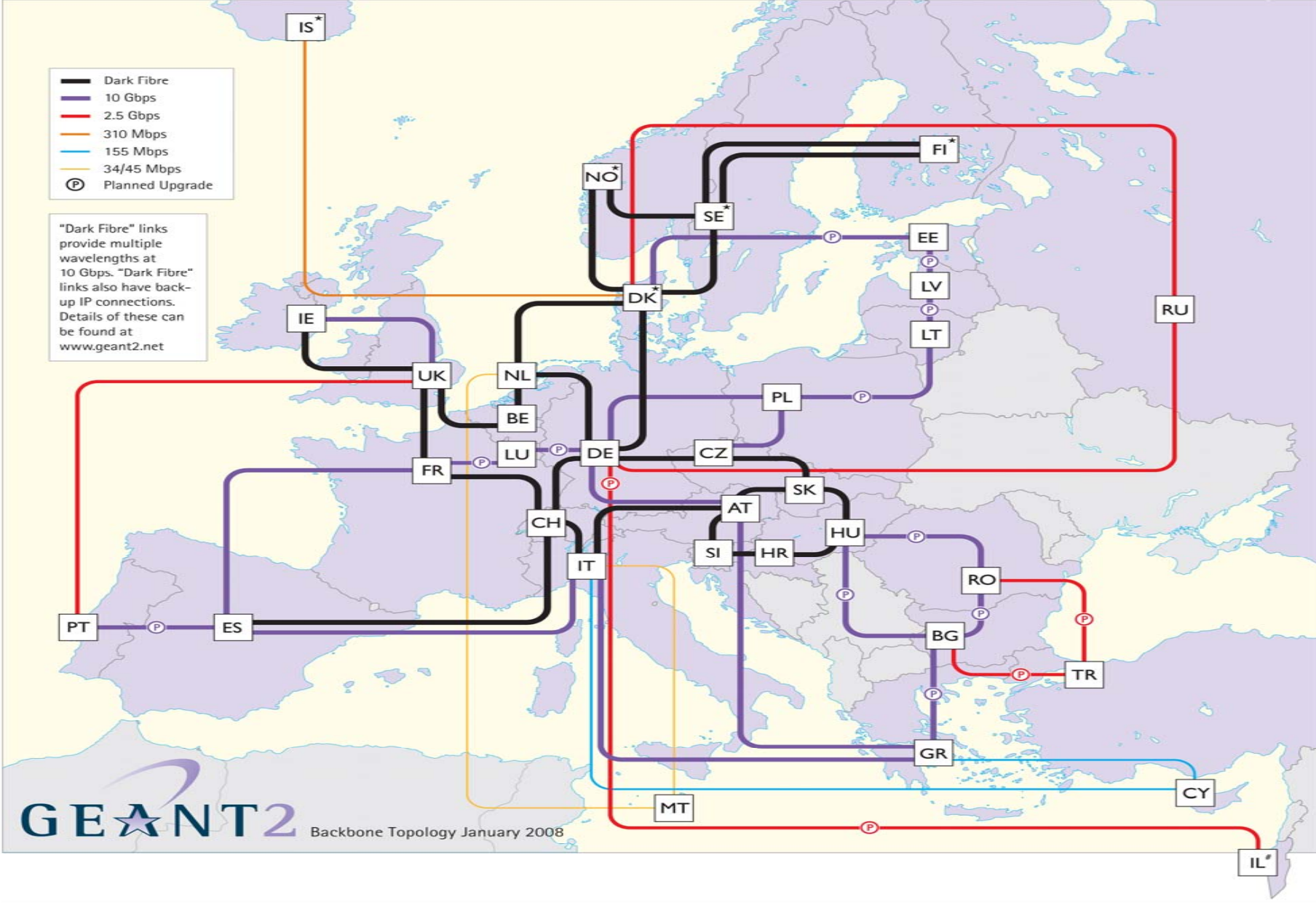




The Geographic Divide

Karel Vietsch
TERENA

Wednesday, 2 April 2008



- Dark Fibre
- 10 Gbps
- 2.5 Gbps
- 310 Mbps
- 155 Mbps
- 34/45 Mbps
- P Planned Upgrade

"Dark Fibre" links provide multiple wavelengths at 10 Gbps. "Dark Fibre" links also have back-up IP connections. Details of these can be found at www.geant2.net

GEANT2 Backbone Topology January 2008

AT Austria	CZ Czech Republic	ES Spain	HR Croatia	IS Iceland*	LV Latvia	PL Poland	SE Sweden*
BE Belgium	DE Germany	FI Finland*	HU Hungary	IT Italy	MT Malta	PT Portugal	SI Slovenia
BG Bulgaria	DK Denmark*	FR France	IE Ireland	LT Lithuania	NL Netherlands	RO Romania	SK Slovakia
CH Switzerland	EE Estonia	GR Greece	IL Israel*	LU Luxembourg	NO Norway*	RU Russia	TR Turkey
CY Cyprus							UK United Kingdom

* Connections between these countries are part of NORDUnet (the Nordic regional network)

* IL includes commodity IP back-up



GÉANT - THE RECIPE

INGREDIENTS

50 Pipes

44 Boxes

10 Technicians



GÉANT - THE RECIPE

Method

Add the pipes to the boxes

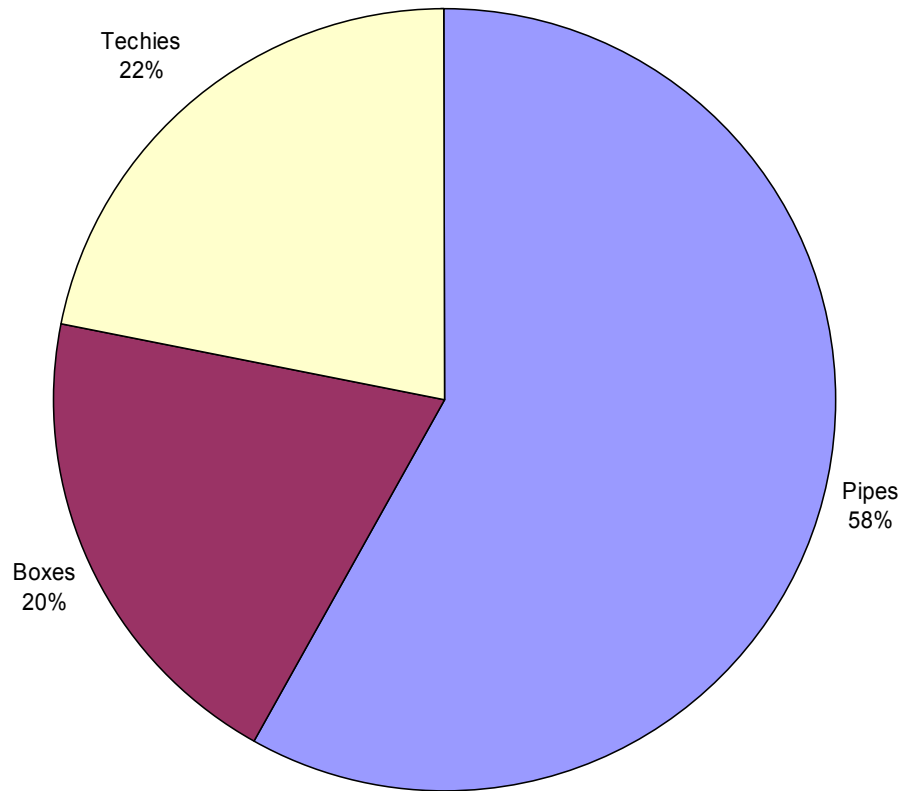
Blend in the technicians

Stir for six months

Best served cold

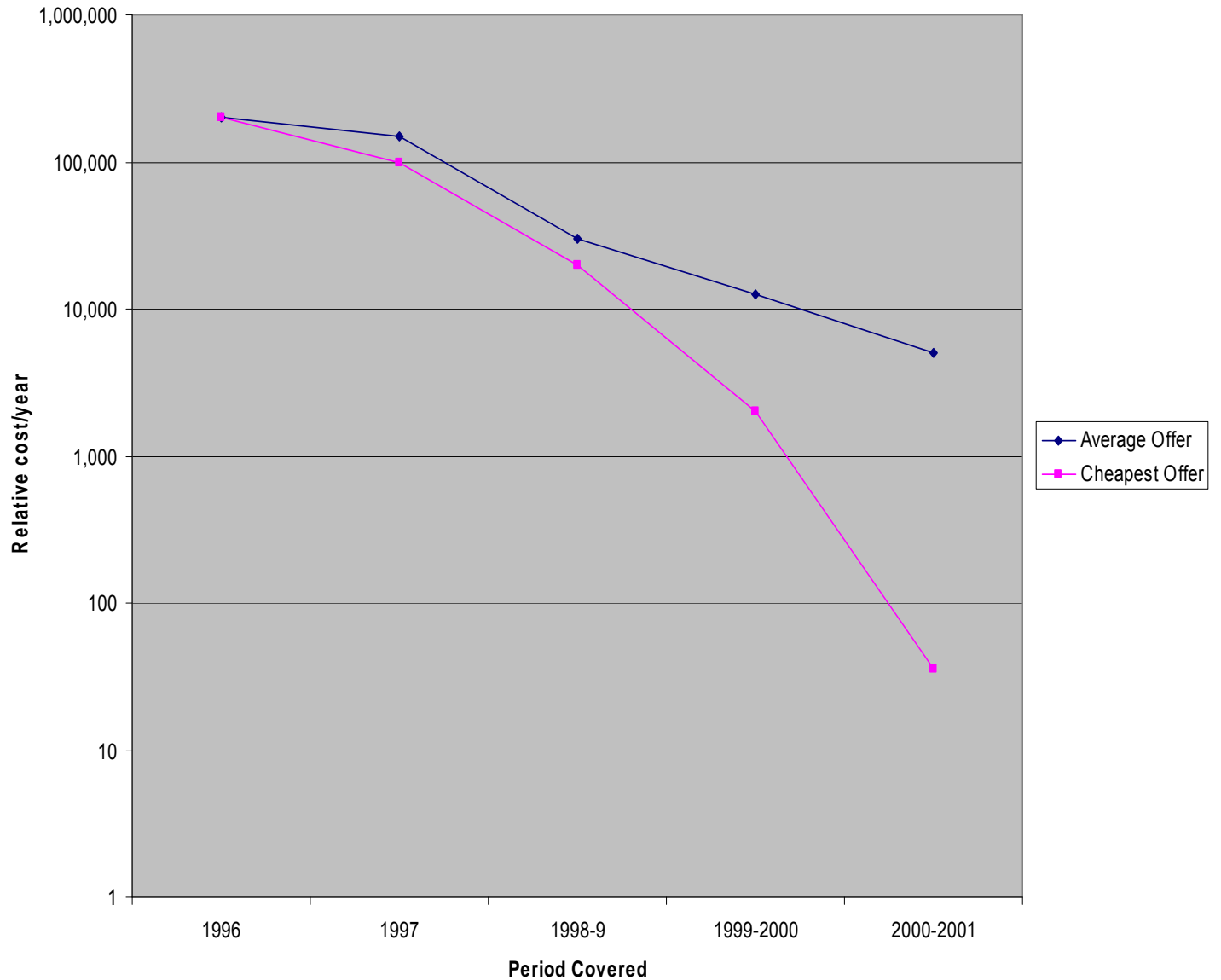


Network Cost by Category





Development of Pipe Prices (Market efficiency)





Ranking by Absolute Cost	Ranking by Relative cost/km	Routes Ranked by Absolute Cost	Routes Ranked by Relative Cost per km
1	19	Austria-Ljubljana	Vienna-Milan
2	12	Brussels-Amsterdam	Madrid-Geneva
3	18	Bratislava-Vienna	Dublin-London
4	8	London-Brussels	Amsterdam-Frankfurt
5	16	Bratislava-Budapest	Copenhagen-Frankfurt
6	4	Amsterdam-Frankfurt	Paris-London
7	6	Paris-London	Copenhagen-Amsterdam
8	14	Prague-Bratislava	London-Brussels
9	21	Ljubljana-Zagreb	Paris-Geneva
10	10	Geneva-Milan	Geneva-Milan



Concentration of Traffic

Digital Divide → Geographic Divide

	pre 2005	today
DUBLIN-LONDON wavelength	1	2
FRANKFURT-GENEVA wavelength	1	12



The Challenges

Market Efficiency – Digital Divide
Distance – Geographic Divide



The EARNEST Foresight Study
2006 - 2007



