



RENATER-4

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The RENATER network

- RENATER : French academic network.
- About 30 POPs (Point of Presence) distributed in France (at least one POP for each French geographic region) on which are connected metropolitan and regional networks.
- More than 800 sites (mainly Universities, Research centres...) are connected to RENATER network **via metropolitan and regional networks.**





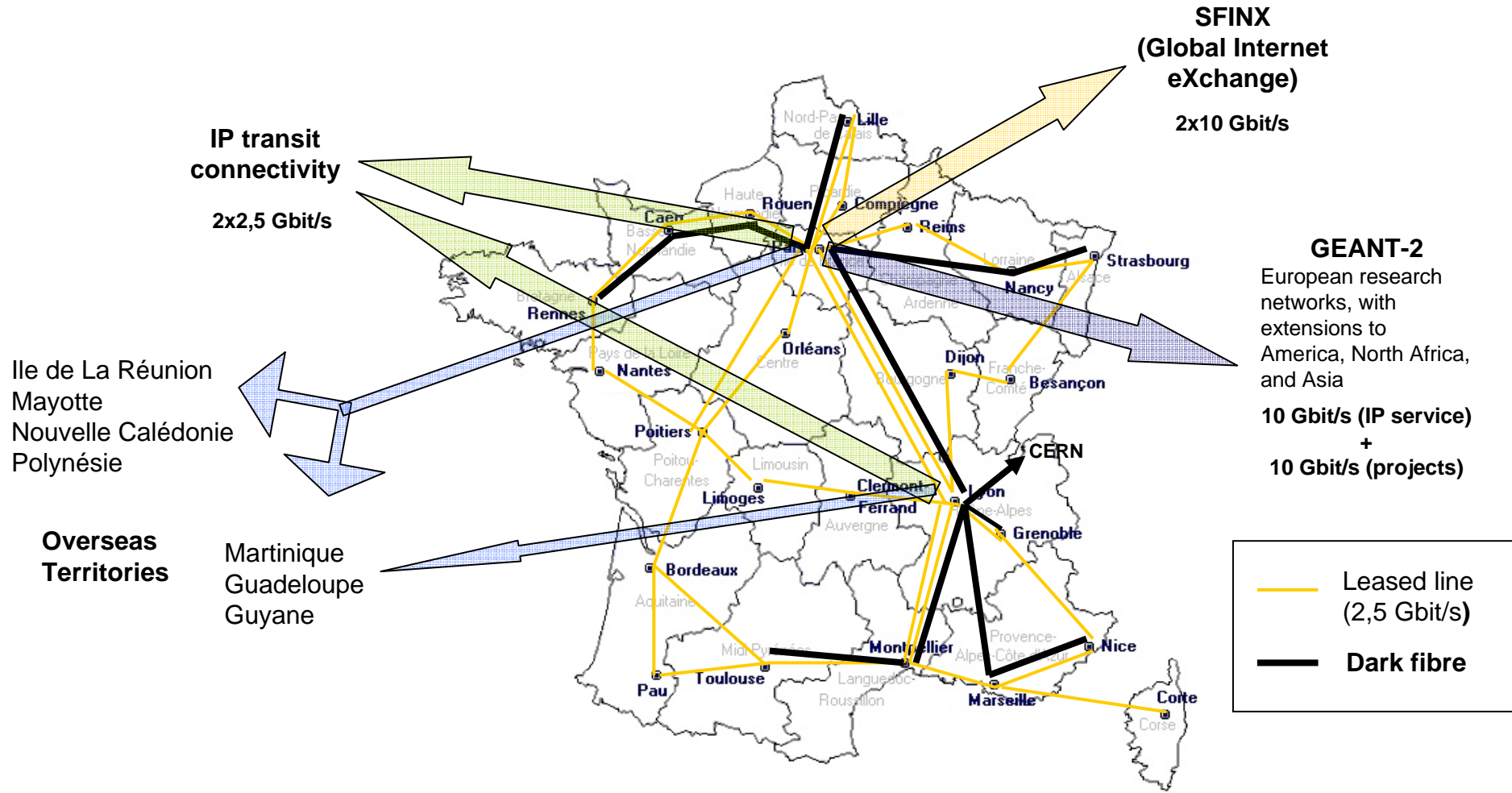
RENATER-4 : services

- Services available with RENATER-4 :
 - IPv4 & IPv6 Unicast
 - IPv4 & IPv6 Multicast (fully operational for IPv4, meanwhile still pilot service for IPv6 Multicast)
 - MPLS-VPN service
 - Classes of Services
 - Associated services :
 - EduRoam
 - Servers certificates
 - **Service of « lambdas » to carry big research projects** such as :
 - GRID-5000 (5000 CPUs distributed in 9 sites for research in Grid Computing) : <http://www.grid5000.org>
 - LHC (Large Hadron Collider) : <http://lhc.web.cern.ch/lhc/>
 - DEISA (Distributed European Infrastructure for Supercomputing Applications) : <http://www.deisa.org/>





RENATER-4 : national backbone

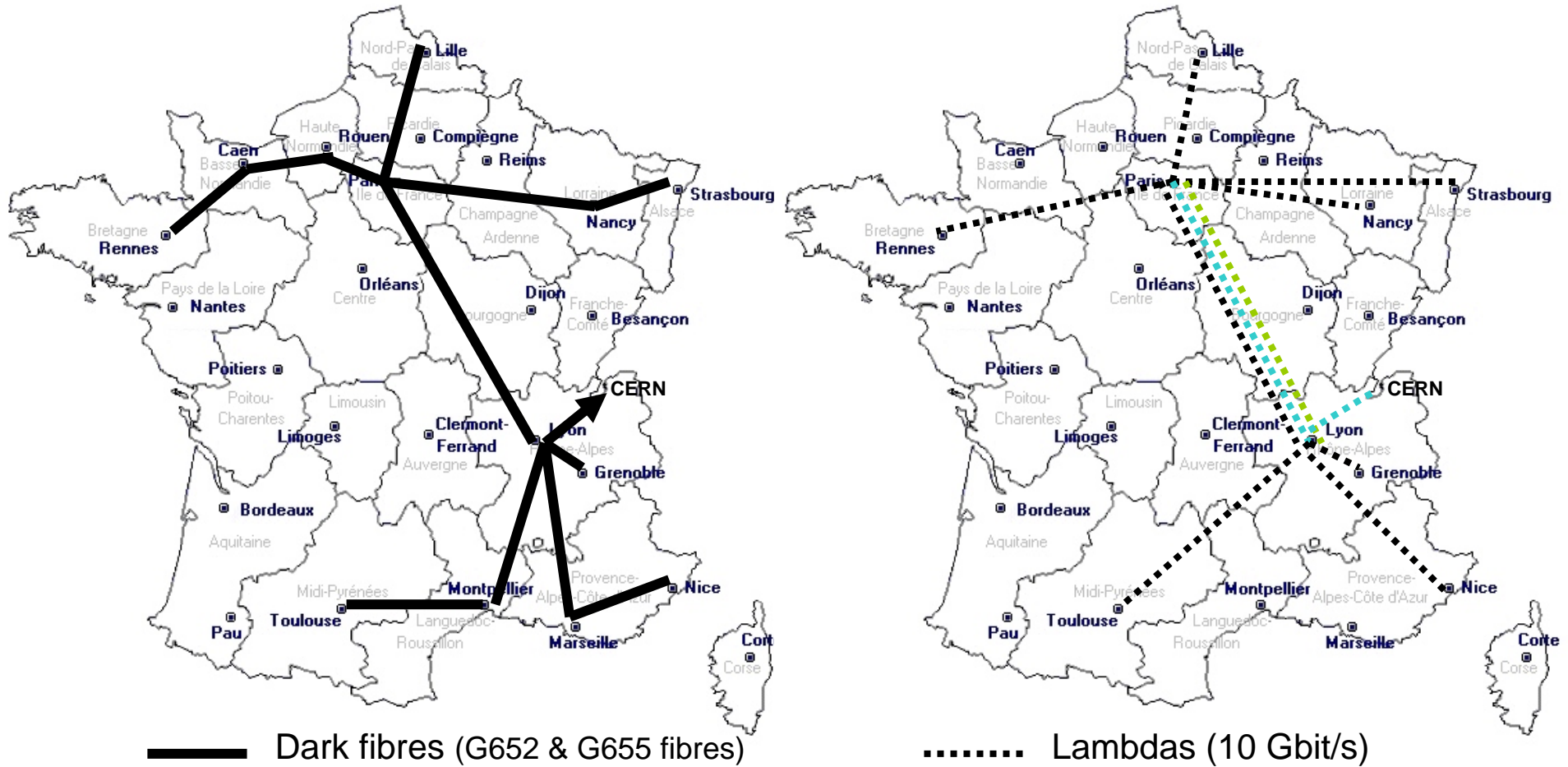


TF-PR





RENATER-4 : dark fibre infrastructure





RENATER-4 : dark fibre infrastructure

- **Request** : it was decided to have only 10 Gbit/s lambdas within the backbone, with up to 8-16 lambdas for a same path.
- **Constraint** : distance of 200-450 kms between 2 RENATER POPs
- **Choice for WDM design** : metropolitan DWDM equipment, with amplification points every 80-120 kms, and regeneration done within the RENATER POPs.





CWDM vs DWDM

	CWDM	DWDM
Number of lambdas	8 lambdas max	8, 16, 32, 64 lambdas ... and more
Lambda spacing	20 nm	0,2 nm (25 Ghz) 0,4 nm (50 Ghz) 0,8 nm (100 Ghz)
Bandwidth	1,25 Gbit/s 2,5 Gbit/s 10 Gbit/s (for some equipment only, and limited number of lambdas anyway : 1 or 2)	1,25 Gbit/s 2,5 Gbit/s 10 Gbit/s 40 Gbit/s
Context	No amplification equipment for CWDM, so limitation for the maximum distance to be covered (between 80 and 120 kms maximum). Used within metropolitan networks.	Amplification equipment available. Technology rather used for long distance distance. Several types of DWDM equipment: - metropolitan (up to 140 kms) - long haul (up to 700 kms) - very long haul (up to 1500 kms) - ultra long haul (up to 4500 kms)
Cost	Cheap	From « not that cheap » to expensive (especially for long haul equipment)

