And now for something completely different ... (?)

Saleem Bhatti (St. Andrews)

David Salmon (UKERNA)

Diversity of research

- Lots of interesting things are happening!
- Hardware & technology evolution:
    - 'Resource poor' systems
    - High-performance
    - Optical, radio, hybrid …
    - etc. …
- Systems:
    - Operating systems
    - Languages
    - Middleware
    - etc. …

Multi-disciplinary work

- Extremely interesting & extremely challenging:
    - Cross-domain vocabulary and working cultures
- Potentially high societal impact
- Examples of mutli-disciplinary work:
    - Economics
    - Medical
    - Crime
    - Environmental
    - etc. …

'Older' areas, still needing attention

- Systems defence & network defence:
  - Becoming increasingly important
- Security & trust
- Routing
- 'QoS' & traffic engineering
- Network management:
  - Monitoring
  - Measurement
  - Traffic & performance analysis
- Others …

Newer areas, increasingly popular

- Wireless:
  - MANET, mesh, radio technologies (various 802.xx)
- Sensors and sensor networks:
  - Environmental sensors, bio-sensors
- Peer-to-peer systems
- Complex systems:
  - Very large distributed systems
- People seem to be doing interesting stuff …

Stuff that *needs* to be done?

- Computer Science "research agendas":
    - Computer Science for e-Science
    - Ubiquitous Computing
    - Others …
- **Networking specific?**:
    - *IAB Concerns and Recommendations Regarding Internet Research and Evolution*, R. Atkinson & S. Floyd (eds), RFC3869, August 2004
    - *Making the World (of Communications) a Different Place*, D. Clark *et al*, ACM CCR, 35(3) July 2005, pp91-96
    - Others …

Does the UK networks community need a **research agenda?**

The same old stuff or something different?

Relevant work in progress

- Test beds are back in fashion:
    - Work on real systems, get real measurements
    - **SuperJANET5 Research Network**
- Make measurements and experimental data available to the community:
    - Reproducibility of results
    - Others can build on your work
- (More than 3 years' funding for PhD students)

SuperJANET5 Research Network

- UKERNA consultation ~3 years ago
- Research community requested:
  - Capability to be paritioned from production traffic
  - 'Separate' connectivity & capacity for research
- SuperJANET5 rollout will include something different than before …
- **We asked for it - now we will have it!**

SuperJANET5 for Science and Research

David Salmon
UKERNA

Strategic Briefing

Overview

- SuperJANET5
- Science & Research requirements
- Infrastructure
- Network services
- Integration of UKLight
- Examples of research use
- Futures/Challenges

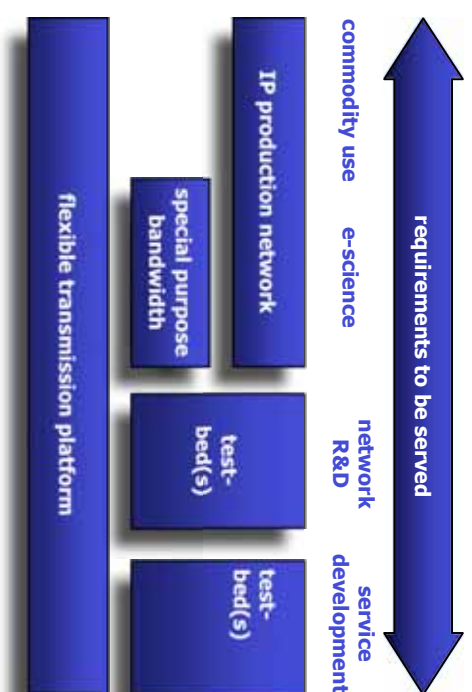# SuperJANET5 Infrastructure

28th June 2006

Strategic Briefing
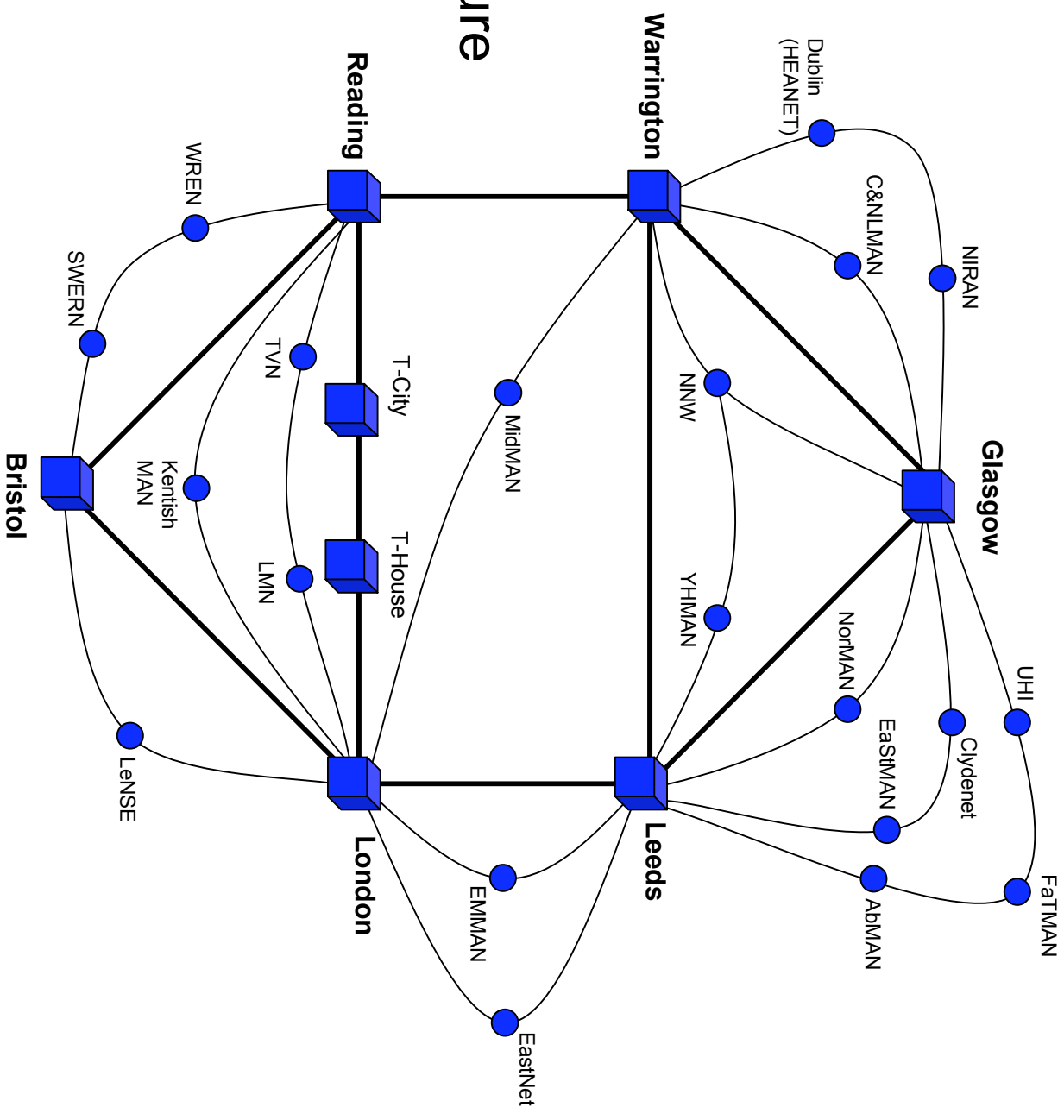
UKERNA

SuperJANET5 Background

UKERNA

Requirements

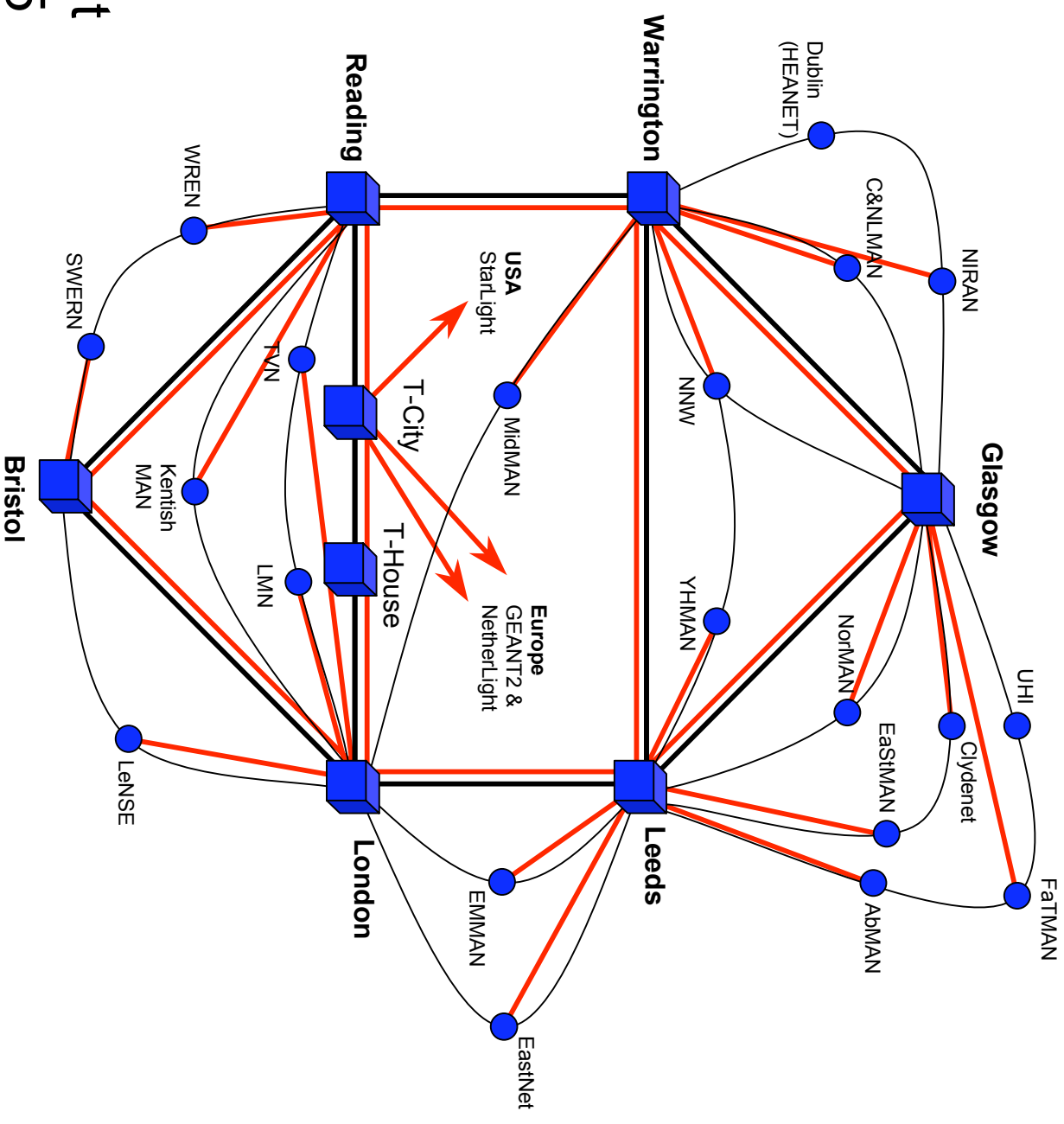| Reliability	improve by building in more resilience
Scalability	ability to increase bandwidth at controllable cost
Separability	protection of interests of teaching & learning and research sectors
Flexibility	responsiveness to additional network service requirements
Visibility	controlled access to network monitoring and measurement information by end users

SuperJANET5 Architecture

commodity use   e-science

requirements to be served

network R&D   service development

IP production network

special purpose bandwidth

test-bed(s)

test-bed(s)

flexible transmission platform

SuperJANET5
Fibre Infrastructure
(simplified)

Strategic Briefing

UKERNA

Reading

Warrington

Dublin (HEANET)

C&NLMAN

NIRAN

WREN

SWERN

TVN

T-City

NNW

Glasgow

MidMAN

Kentish MAN

Bristol

LMN

T-House

YHMAN

NorMAN

UHI

EaStMAN

Clydenet

FaTMAN

AbMAN

LeNSE

EMMAN

Leeds

London

EastNet

SuperJANET5
Research capacity
Integrating UKLight
with SuperJANET5

Strategic Briefing

UKERNA

Reading

Warrington

Dublin (HEANET)

WREN

C&NLMAN

NIRAN

SWERN

USA
StarLight

TVN

T-City

MidMAN

NNW

Glasgow

Kentish MAN

LMN

T-House

Europe
GEANT2 &
NetherLight

YHMAN

NorMAN

UHI

Bristol

EaStMAN

Clydenet

LeNSE

London

EMMAN

Leeds

AbMAN

FaTMAN

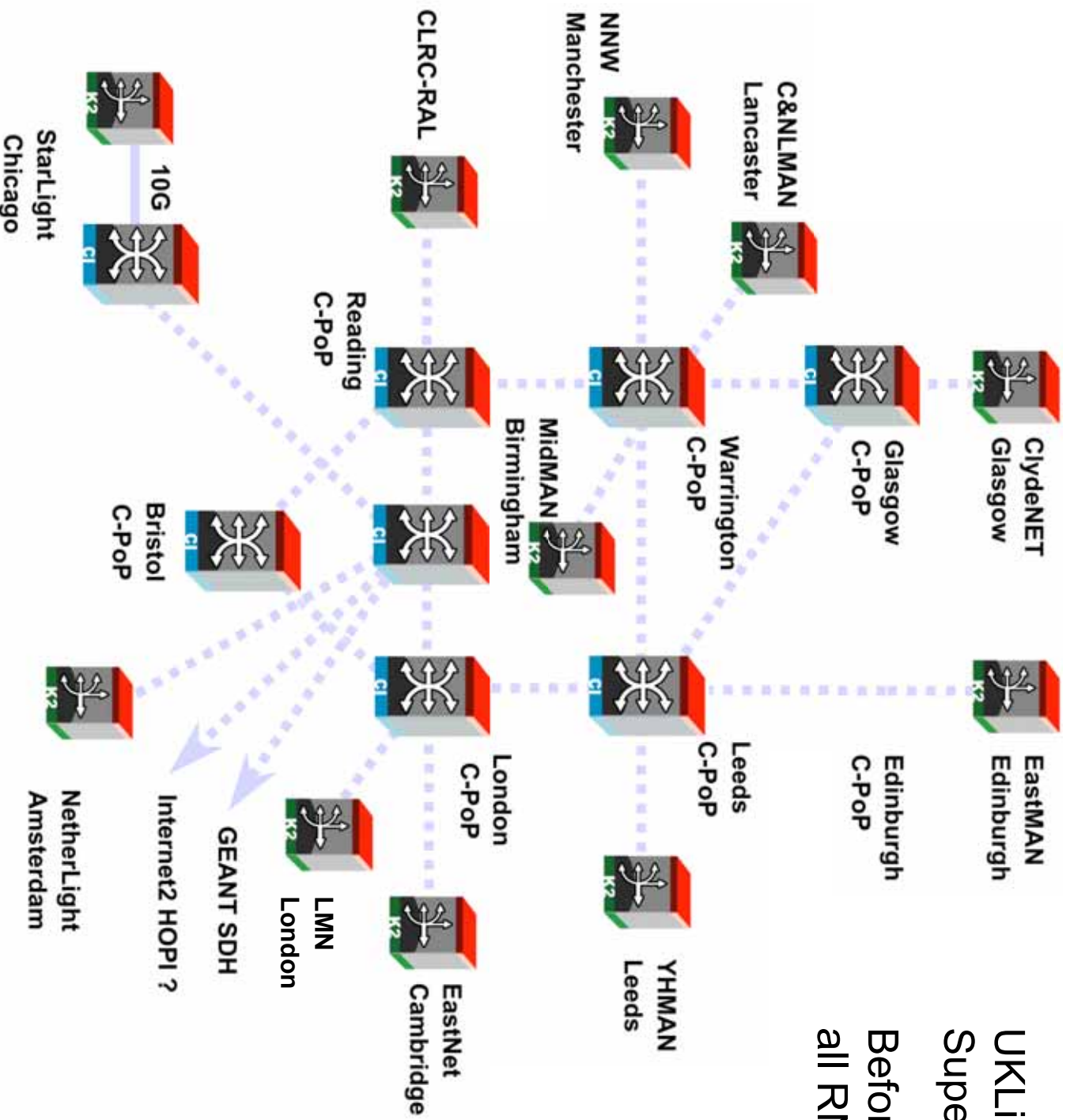EastNet

SuperJANET5 Network Services

- JANET IP service
  - High capacity
  - Resilient engineering
  - Dual connection to each Regional Network
- Point to point circuits (wavelengths / lightpaths / lambdas…)
  - UKLight style
    - 50Mb/s – 2.5Gb/s
  - Optical layer
    - 1GE, 2.5 Gb/s, 10Gb/s
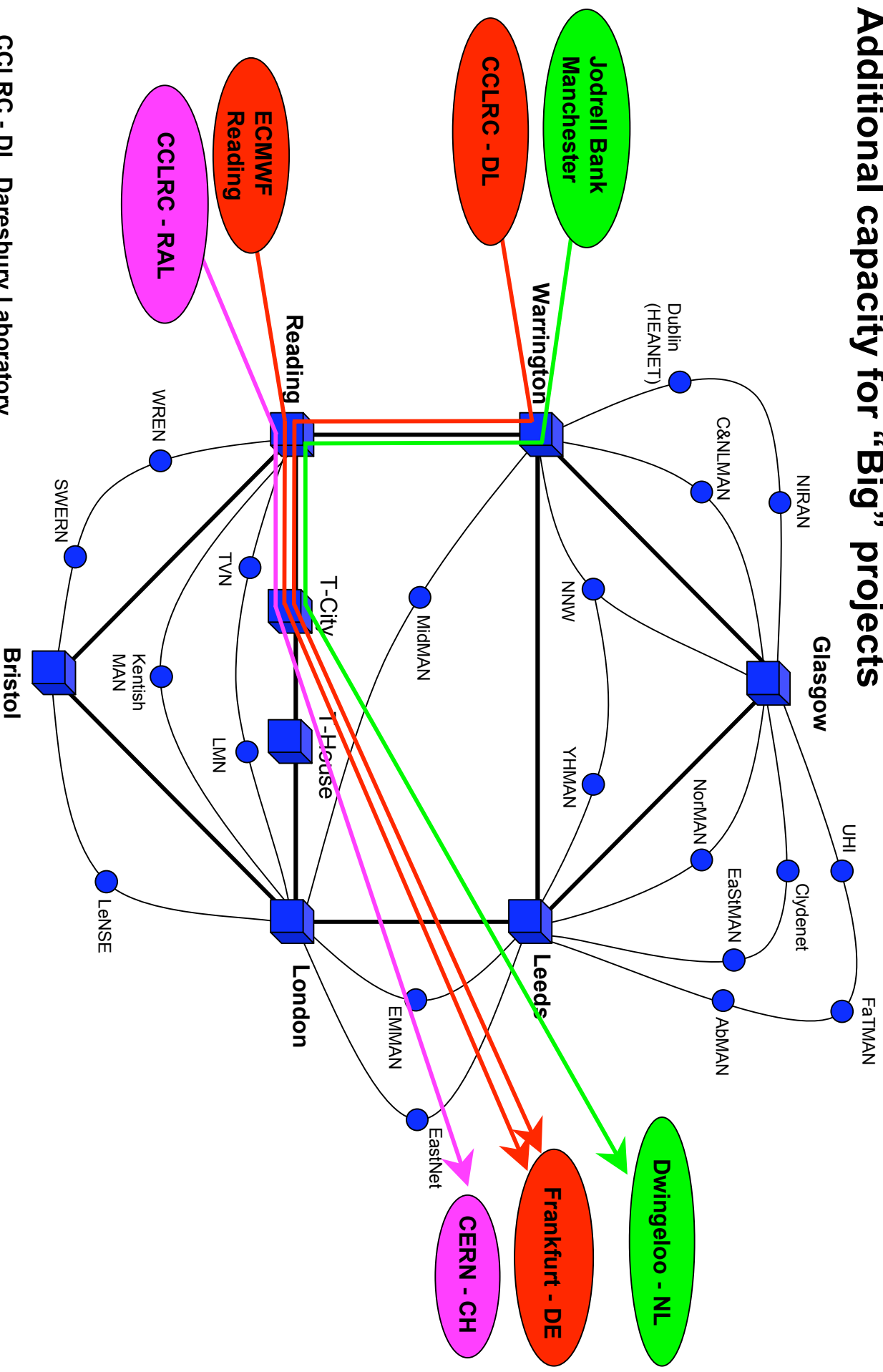
JANET IP

UKLight - SDH Transmission

Optical Transmission (DWDM)

Strategic Briefing
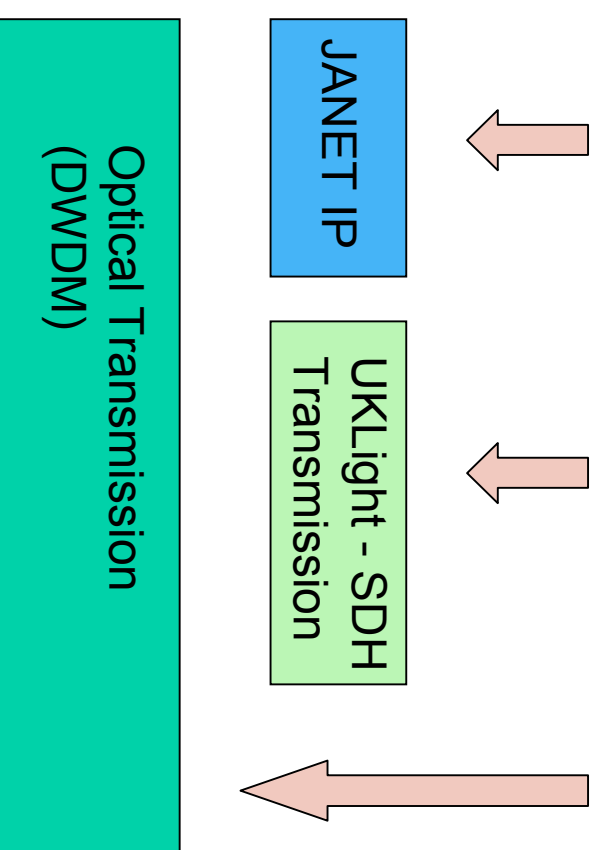
UKLight on
SuperJANET5
Before extension to
all RNs

StarLight
Chicago

10G

CLRC-RAL

Reading
C-PoP

NNW
Manchester

C&NLMAN
Lancaster

MidMAN
Birmingham

Warrington
C-PoP

Glasgow
C-PoP

ClydeNET
Glasgow

Bristol
C-PoP

NetherLight
Amsterdam

Internet2 HOPI ?

GEANT SDH

London
C-PoP

Leeds
C-PoP

Edinburgh
C-PoP

EastMAN
Edinburgh

LMN
London

EastNet
Cambridge

YHMAN
Leeds

Additional capacity for "Big" projects

CCLRC - DL Daresbury Laboratory
CCLRC - RAL Rutherford Appleton Laboratory
ECMWF – European Centre for Medium Range Weather Forecasting

10Gb/s wavelengths at the optical transmission layer

SuperJANET5 summary

- Telco grade transmission infrastructure dedicated to JANET – NO sharing !
- Suppliers: Verizon Business (was MCI) & Ciena
- Fibre everywhere
  - 5500km
- Designed for resilience
  - Dual entry points to RNs
  - All RN requirements met
- Ability to add additional bandwidth at marginal costs

28th June 2006

Strategic Briefing

Questions

28th June 2006

Strategic Briefing

UKERNA