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

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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 multi-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 partitioned 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!**
David Salmon
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SuperJANET5 for Science and Research

28th June 2006
Overview

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

Science & Research Requirements
Infrastructure
Network Services
Integration of UKLight
Examples of research use
Futures/Challenges
SuperJANET5 Infrastructure
SuperJANET5 Background

SuperJANET5 Architecture

Requirements

Visibility
- Information by end users
- Controlled access to network

Flexibility
- Network service requirements
- Responsiveness to additional test-beds and test-sites

Separability
- Protection of interests of learning and research sectors
- Controllable cost

Scalability
- Ability to increase bandwidth at controllable cost
- Improve by building in more resilience

Reliability
- Requirements to be served
(Simplified) Fiber Infrastructure
SuperJANET5
Integrating UKLight Research capacity with SuperJANET5

SuperJANET5

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SuperJANET5

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Integrating UKLight Research capacity with SuperJANET5

SuperJANET5
SuperJANET5 Network Services

- JANET IP
- UKLight - SDH
- Optical Transmission (DWDM)

- JANET IP Service
- Regional Network
- Dual connection to each
- Resilient engineering
- High capacity

- 1GE, 2.5 Gb/s, 10Gb/s
- Optical Layer
- 50Mb/s – 2.5Gb/s
- UKLight style
- Uplinks

- Optical Transmission (DWDM) / Wavelengths / Lightpaths / Lambdas...
Before extension to SuperJANET5
UKLight on
Additional capacity for “Big” projects

10Gb/s wavelengths at the optical transmission layer
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