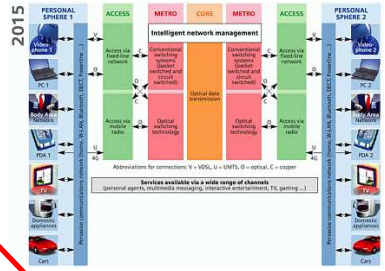
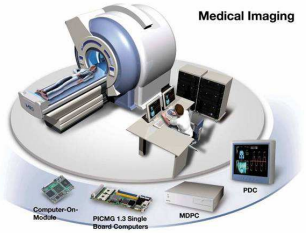
Aurora: The UK's Experimental Platform for Clean Slate Network Research:

An Optical Network Test-bed for Emerging Network Technologies

Alwyn Seeds (UCL), Dimitra Simeonidou (University of Essex)

JANET Aurora : The UK's Future Internet Test-bed



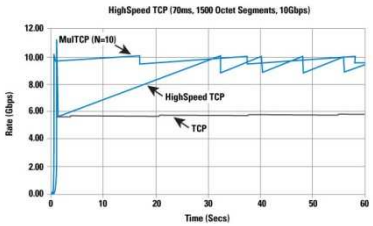


Aston

Cambridge

JANET Aurora DF

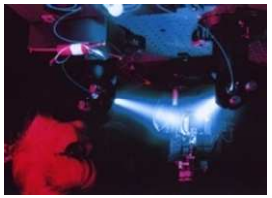
Essex

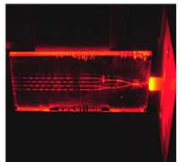


UCL

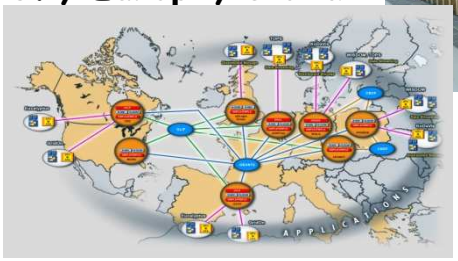
London TeleHouse

UK, Europe, Global

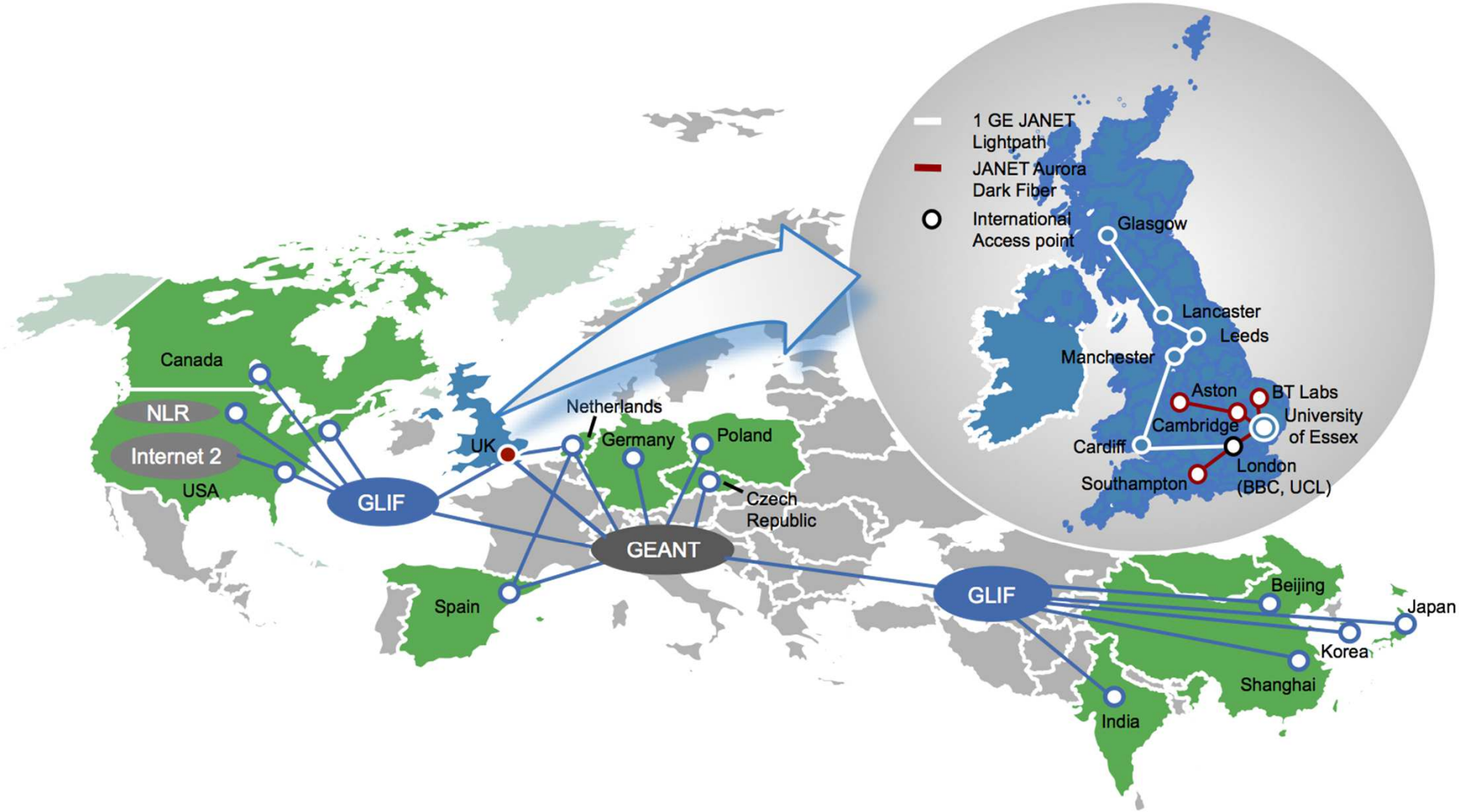




Southampton



Connectivity to Europe and Beyond



Realising Infrastructure Capabilities: Research Evaluation Platforms

Simulation Facilities

OPNET® Modeler, VPI TransmissionMaker™, Customized MATLAB models/simulations, Design and development of application specific simulation models (e.g., C/C++), Co-Simulation studies (e.g., OPNET+MATLAB) to capture the impact of cross-layer issues.

Emulation Facilities

Extensible Optical Network Emulation (E1), Emulab-based emulation facilities, Common Open Research Emulators, Customized models of systems/sub-systems for integration in Emulation facility.

Technology prototypes and Experimental test-beds

London Olympics 2012

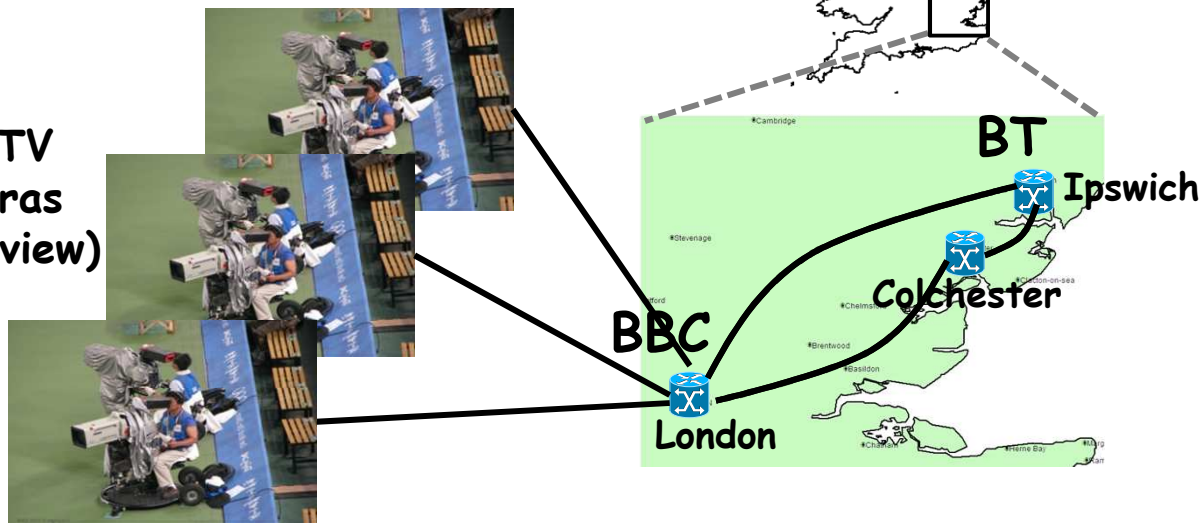
- Implement and demonstrate experimental services for real-time 4K and 8K multi-view video formats

Sporting event

Remote location

UHDTV Back Projection
7680x4320

UHDTV
Cameras
(Multi-view)



Audience

Current Status

•Statement of need submitted to EPSRC ICT Mid-Range Facilities Consultation to provide a dark fibre networking facility accessible to the UK ICT research community- 2009

•The panel ranked it top in priority- 2009

•Progress in the tender has been delayed due to uncertainty on JISC funding of underlying dark fibre

•JISC has now confirmed support for future leasing the Aurora dark fibres connecting Cambridge-Essex-UCL-Southampton- 2011

•It would now be possible for a tender to proceed

Discussion Slides

Ivan Andonovic, Keith Barnham, Martin Dawson,
Richard Penty, David David Richardson, Alwyn Seeds,
Wilson Sibbett, Dimitra Simeonidou, Ian White

Ongoing Advances

- A field of rapid development
  - Data rates growing 10x per < 4 years
  - Dramatic growth in use of intelligent sensors – with sensor integration at heart of activity
  - Generic underpinning advances
    - Costs falling rapidly making new systems concepts feasible
    - New wireless and wired sub-system functionalities being rapidly introduced
    - Energy rapidly becoming an opportunity and challenge for ICT

A field of Opportunity

- Video revolution yet really to start
- Personal healthcare in infancy
- Major advances in media still to be exploited (3D TV)
- Artificial intelligence although now conceptually feasible, yet to be considered seriously

Grand Challenges

- A field of great Challenges
  - Evidence of limits on communications capacity using conventional techniques
    - Using either wired or wireless systems
  - The Energy bottleneck
    - ICT now consumes more energy than air travel
    - Energy is becoming the limit on short haul transmission and switching
  - Costs must fall
    - New systems technologies required to allow bespoke development
    - Systems integration needs a step advance
    - Photonics packaging a major cost barrier
  - The skill base must be multidisciplinary *AND YET* cutting edge
    - Architectures, computation, networks, wireless, photonics, THz …

EPSRC ICT- related Research Activities

- Clear evidence of strong industrial engagement
  - KT activities using wide range of mechanisms including IKCs and IMRCs
- Clear evidence for strong applications/service level research
- Clear routes for fundamental materials and physics research
- Exemplars for systems-led research within the WINES scheme

  eg TINA project
  - *Importance of maintaining and enhancing this activity if UK industry is to have a significant role in the digital economy*

Proposed Route Forward

- We would like to develop an approach to carry out detailed technical studies in order to:
  - Assess the opportunities and challenges in the technology and application of ICT
    - Obtain a list of agreed goals/grand challenges for the field
    - Build a coherent case for the field
  - Determine areas deserving specific research and innovation within the UK
  - Assess the research disciplines involved
  - Assess the potential for industrial collaborations
  - Determine a list of potential academic participants
  - If the potential is agreed, scope programme possibilities

Methodology

- Technical studies in order to support ICT research perspective:
  - Steering committee to scope studies
  - Studies commissioned across ICT space
  - Funding to second RA effort from expert groups to carry out detailed study work
  - Study results to be open for ICT community review/discussion
  - Studies can be used to help new programme definition