



# Overview of the Glow Project

**Jim Buchan**

**Vertical Solutions Architect**

**Public Sector Emerging Markets Team**

**Cisco Expo – Egypt January 2010**

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# Agenda

- Overview of SSDN/Glow
  - Background info about Scotland/Me
  - SSDN/Glow Interconnect
  - SSDN/Glow - Content Delivery Network
  - SSDN Intranet – Glow

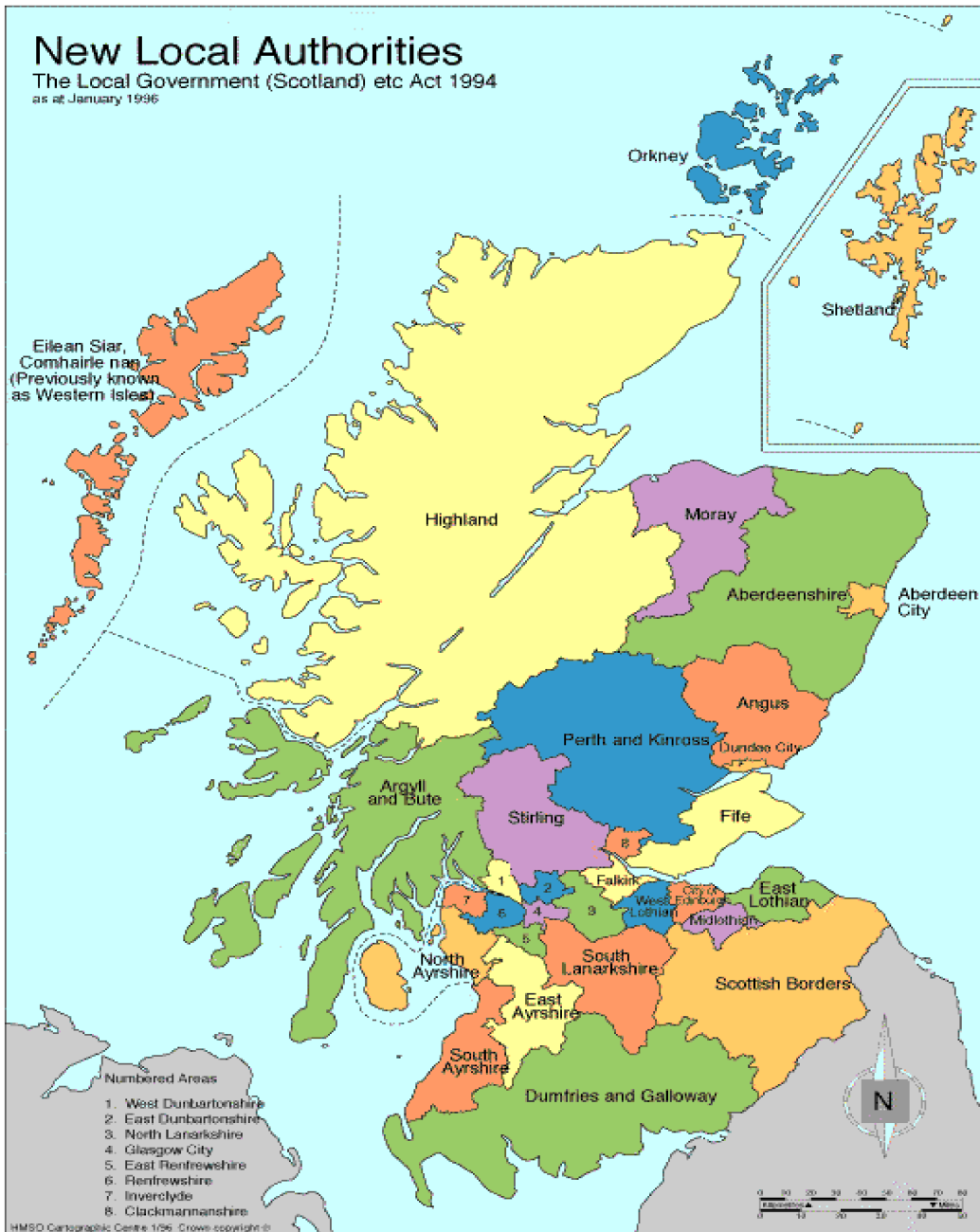
# Jim Buchan – Vertical Solutions Architect - EM

- Teacher, Development Officer, Senior Lecturer, Systems Manager, International IT Consultant ( Botswana/Namibia).
- National Development Officer for UKERNA – NREN infrastructure procurement and implementation for UK/Scotland.
- Lead Technical Consultant for Scottish Pathfinder Project.
- Chief Technical Officer for Glow – Interconnect, Content Delivery Network and Glow learning Platform.
- Full CV at:  
[http://web.me.com/jimbuchan/Jim\\_Buchans\\_CV/Jim\\_Buchan\\_CV.html](http://web.me.com/jimbuchan/Jim_Buchans_CV/Jim_Buchan_CV.html)
- Joined Cisco January 2008

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# IT in Scottish Education some background information





**Some Metrics**

Scottish Government

32 Local Authorities

~ 3,000 Schools

~ 53,000 Teachers

~ 750,000 Pupils  
 inc Parents -

~ 1.5 million users

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# Schools and IT

- 1990's schools connected to Internet directly
- Educational ISP's provided service for schools
- Walled garden - a filtered Internet service
- Bandwidth limited - typically analog modem (56 kbps max) and ISDN 1 (64 kbps with fast call setup)

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# Schools and IT

- “Schools Internet Dialer” a special commercial service for schools – Oftel authorized this.
- Based on ISDN 1 or 2
- Typically the school router connects on demand
- Unmetered access 8am - 6pm
- Metered service out-with above service hours
- No facility for calls to be initiated from hub - out going traffic triggers link-up

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# SSDN Project

- Project consists of 3 main components
  - SSDN/Glow Interconnect
  - SSDN/Glow - Content Delivery Network
  - SSDN Intranet – Glow
- Whole project now called Glow
- Whole Project driven by Learning Priorities – not a technology led project.
- My Role – Chief Technology Officer

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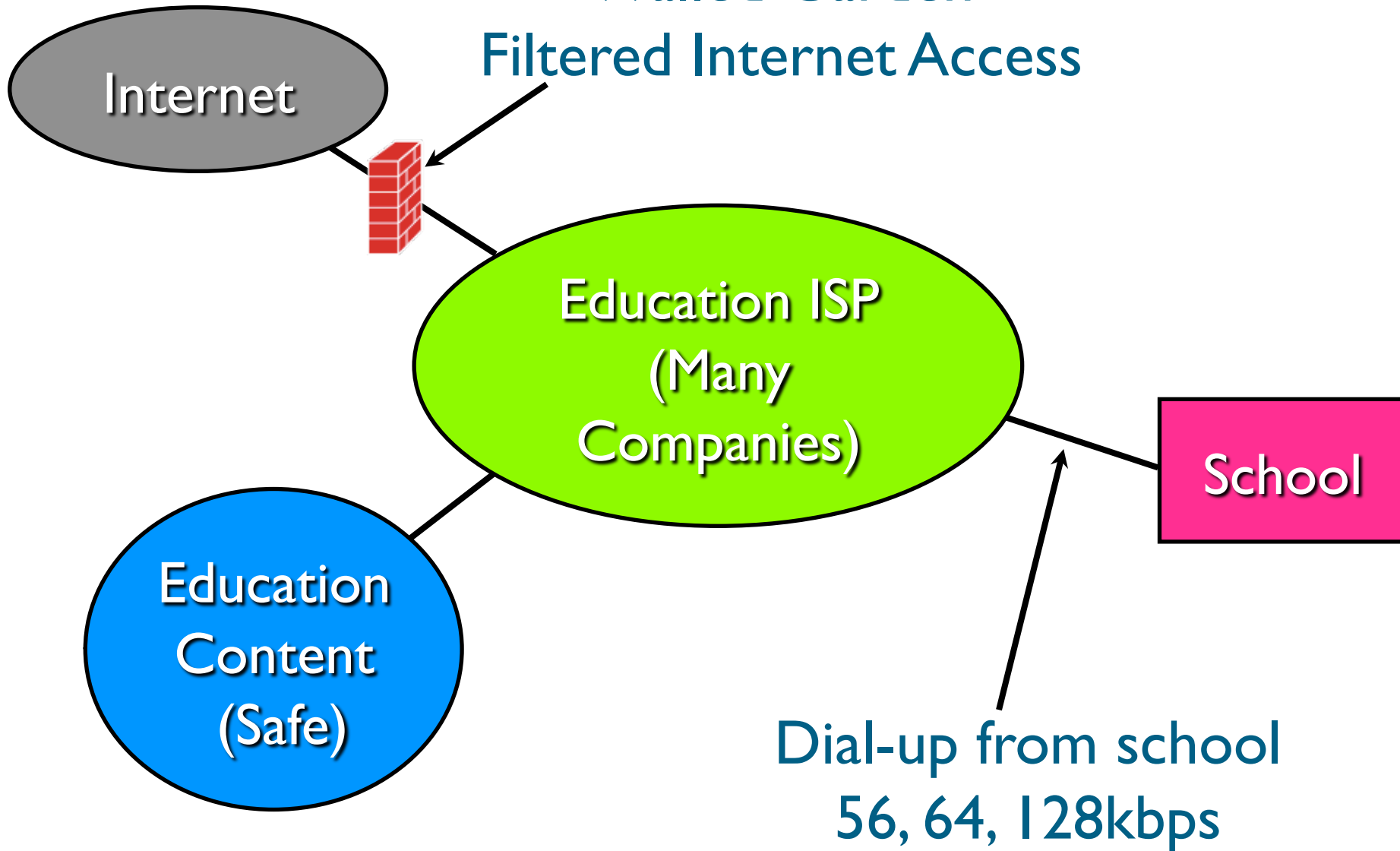
# Overview the Interconnect

- Connecting each of Scotland's Local Authorities (responsible for providing the Education service)
- JANET (UK NREN) used as the network core and for Internet transition

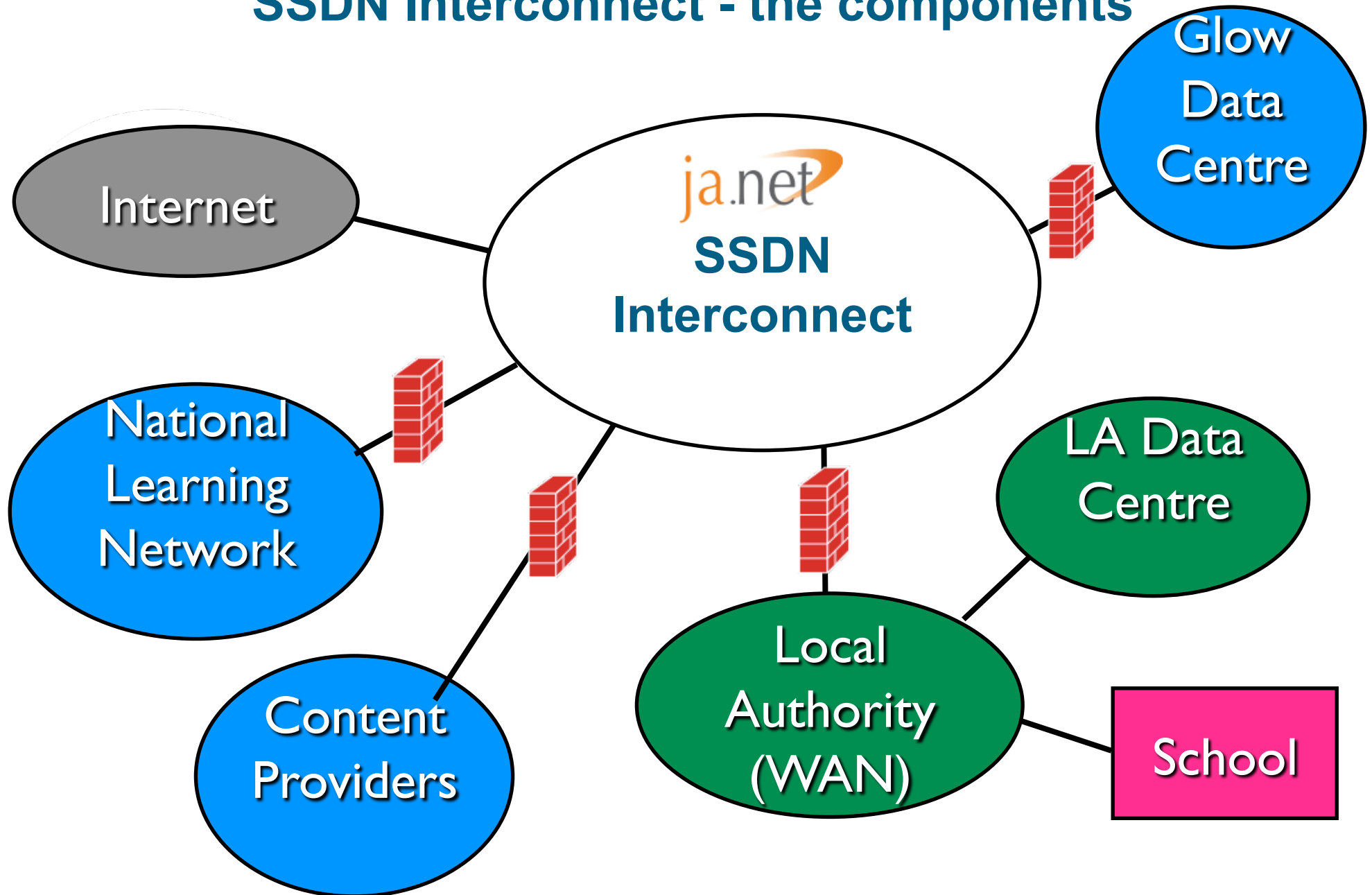
# Internet Access for schools(UK) - early days

Walled Garden

Filtered Internet Access



# SSDN Interconnect - the components

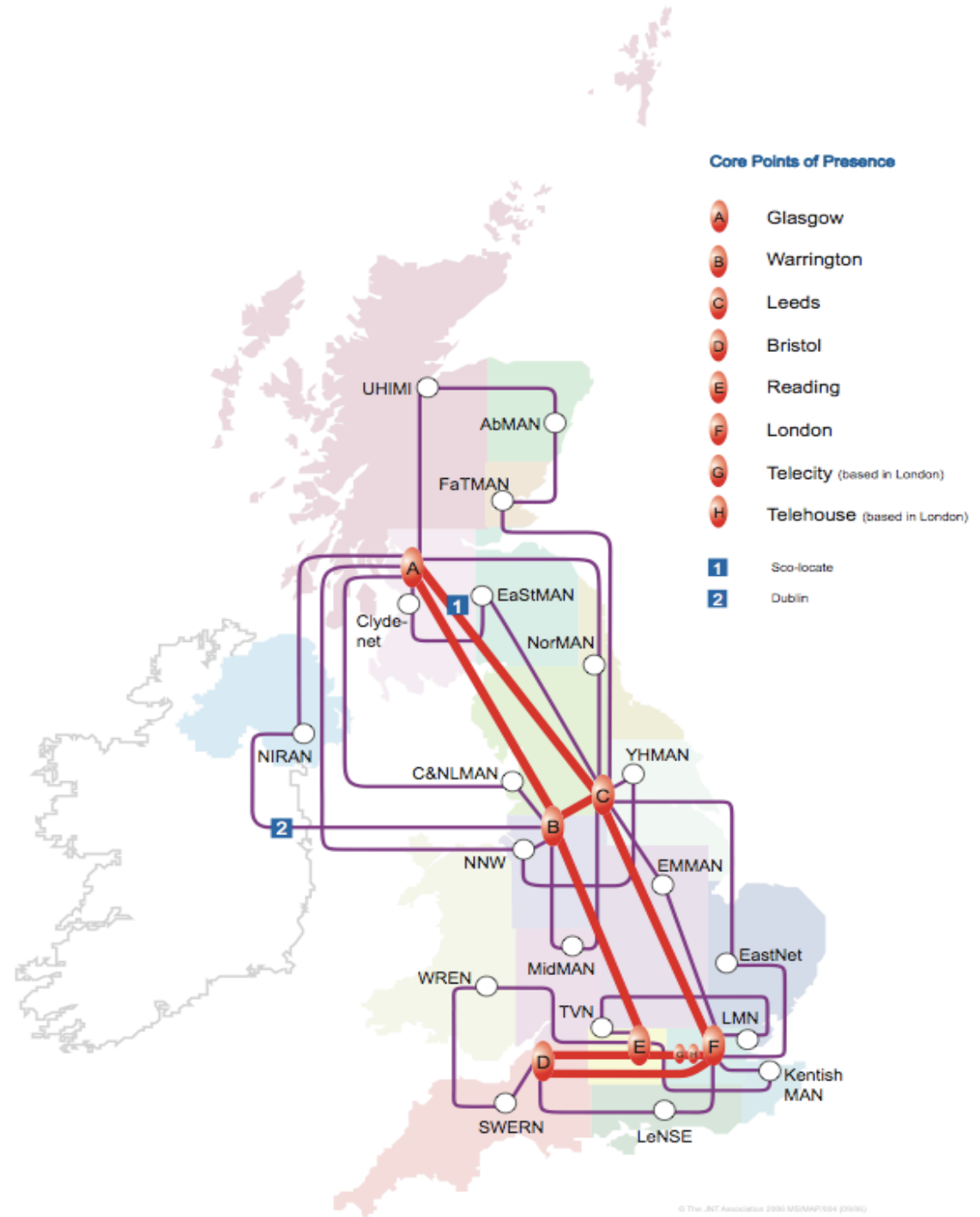


# Janet Topology

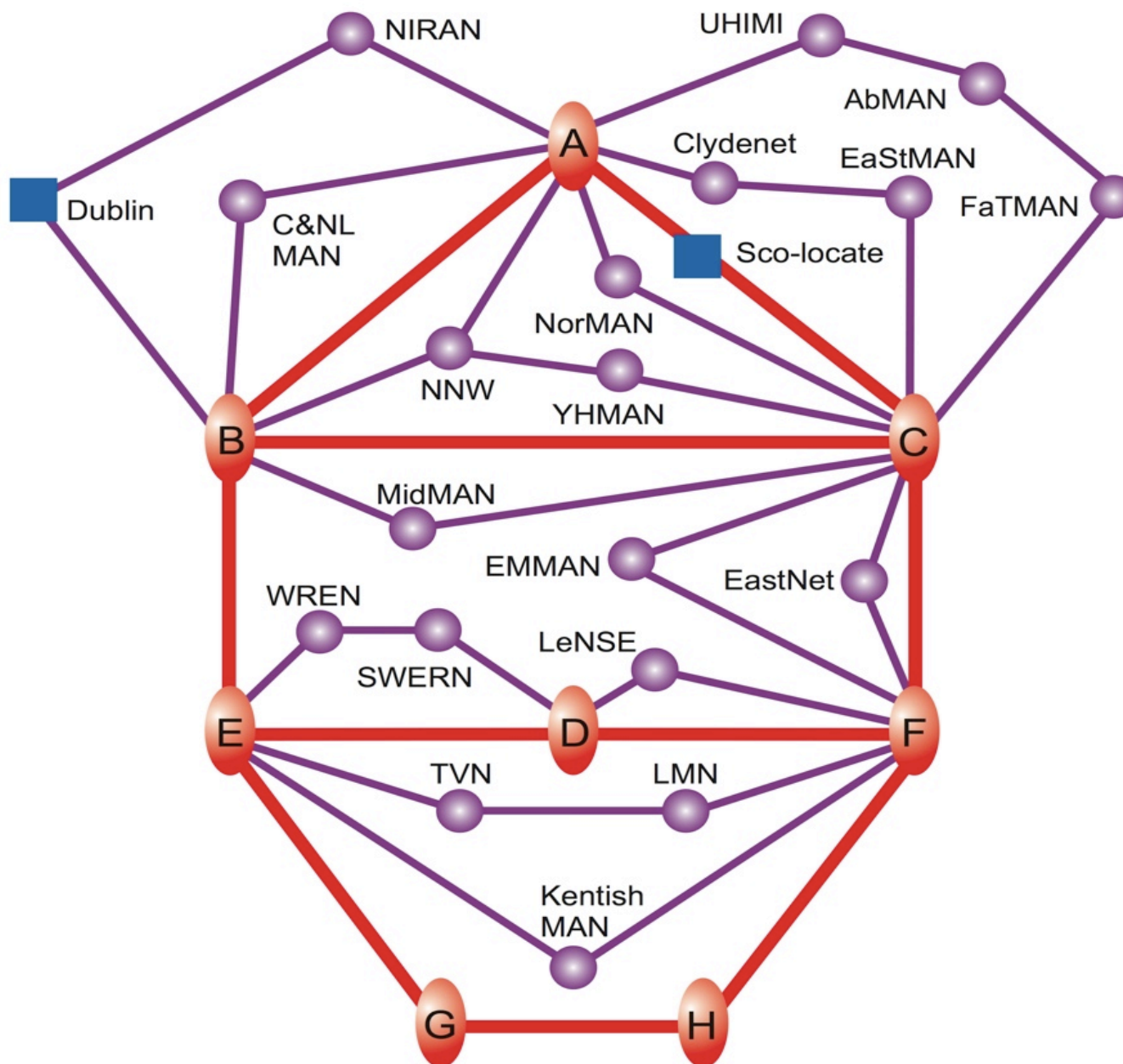
Serves all levels of  
Education

HE (Universities), FE  
(Colleges), Schools,  
Nurseries.

Also Local Government  
(100% in Scotland and  
Wales)







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# Janet

- Very high bandwidth (room for growth 10/40Gb core)
- Dark fibre core with DWDM (operated by contractor for now)
- Unfiltered Internet Access
- Core for Glow Interconnect, RBC Interconnect.
- Connects to Welsh Public Sector Broadband Network, C2K for UK wide and Internet transit.

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# Janet

- Suitable for Research work (inc. Photonics)
- Supports real time applications - Video Conferencing etc.
- Can support IP telephony
- Costs are minimized - Janet (UK) is not for profit company
- Various telecom/Services Provider companies are supplying circuits/services

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# Janet - Regional Networks

- Connecting Universities and Colleges
- Generally very high bandwidth networks with dual connections to core network
- Generally operated by consortium (Memorandum of Agreement between members) or special purpose company.
- also connect to Enterprise/Science parks for local collaboration
- 20 Regional Networks in place

# The JANET Regional Networks HE/FE

North East Metropolitan  
Area Network

Edinburgh & Stirling  
Metropolitan Area Network

South West England  
Regional Network

Learning Network  
South East

Aberdeen Metropolitan  
Area Network

South Wales  
Metropolitan Network

Kentish Metropolitan  
Area Network

Midlands Metropolitan  
Area Network

Network  
North East

Clyde Area Network

Northern Ireland Regional  
Area Networking

Cumbria & North Lankashire  
Metropolitan Area Network

Yorkshire and Humberside  
Area Network

East of England Network

Fife and Tayside  
Metropolitan Network

East Midland Metropolitan  
Area Network

University of the Highlands  
and Islands Network

London Metropolitan  
Network

Thames Valley Network

North Wales  
Metropolitan Network

<http://www.ja.net/services/connections/janet-sites/mans/>

# JANET External Connectivity

Global Transit				
Client	Private Peering			
	Client	Location	Speed	Live Date
TeliaSonera	BBC (Multicast)	Via LINX (Telehouse PoP)	1 Gbps	6/6/02
TeliaSonera	BTnet	Via LINX (Telehouse PoP)	2 Gbps	09/10/09
Tata Commun	Digitalbrain Plc	Telehouse PoP	1 Gbps	25/10/04
Tata Commun	Energis	Via LINX (Telehouse PoP)	1 Gbps	17/5/05
European Re	Bogons Ltd	Via LINX (Telehouse PoP)	1 Gbps	15/8/05
Client	Pipex	Via LINX (Telehouse PoP)	1 Gbps	13/04/06
GEANT2	Virgin Radio	Telehouse PoP	1 Gbps	14/11/06
GEANT2	BBC	Via LINX (Telehouse PoP)	1 Gbps	18/6/07
HEANET	Datahop	Telecity PoP	1 Gbps	10/12/07
HEANET	Google	Via LINX (Telehouse PoP)	10 Gbps	14/3/08
LINX	Inuk Networks	Via LINX (Telehouse PoP)	1Gbps	02/07/08
LINX	Akamai	Via LINX (Telehouse PoP)	10 Gbps	01/08/08
LINX	BBC	Via LINX (Telehouse PoP)	10 Gbps	05/08/08
LINX	Google	Via LINX (Telecity PoP)	10 Gbps	04/09/09
MaNAP Netw	Akamai	Telecity PoP	10 Gbps	09/07/09
MCIX	Limelight Networks	Telehouse PoP	10 Gbps	03/12/09

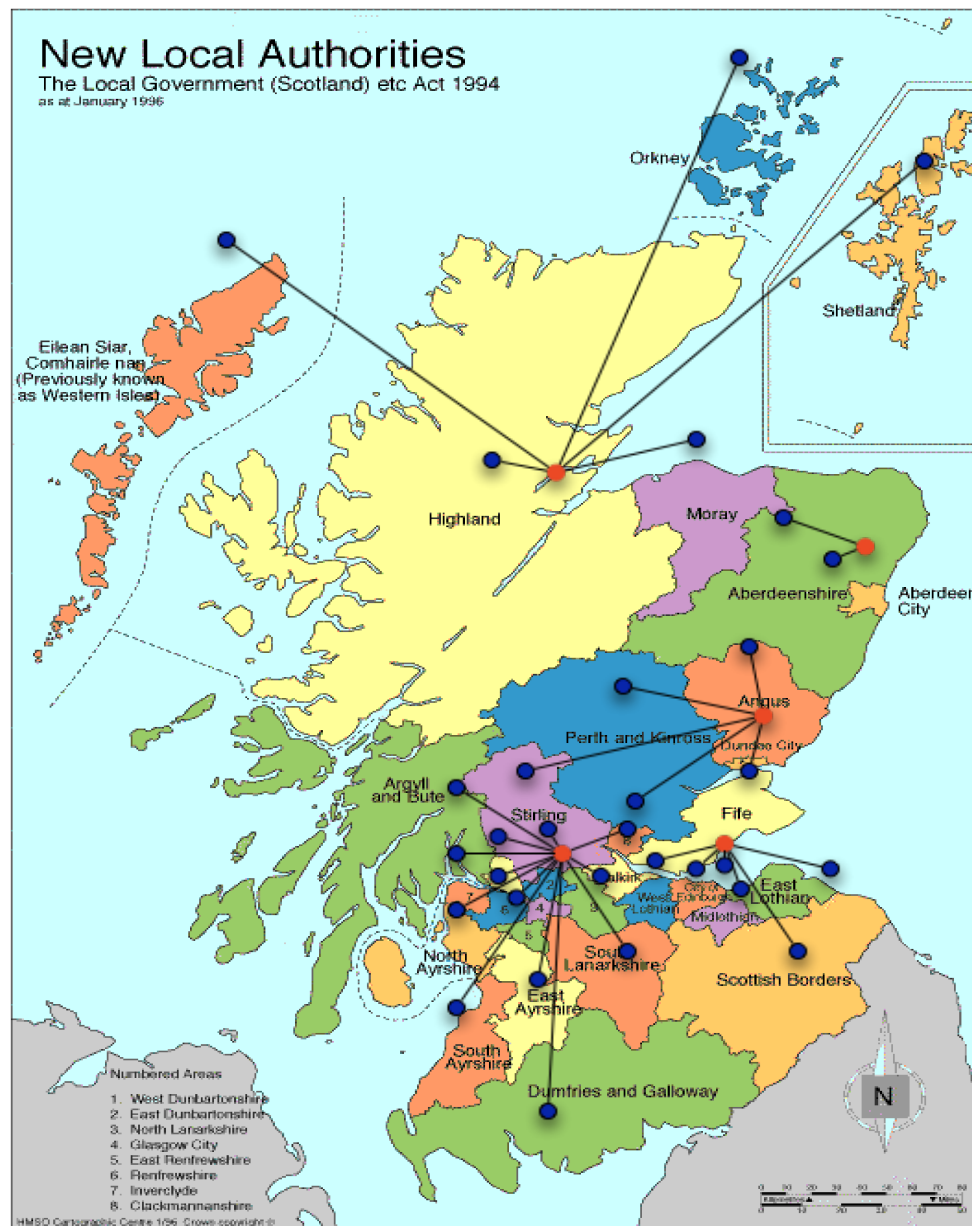
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# SSDN Interconnect V1

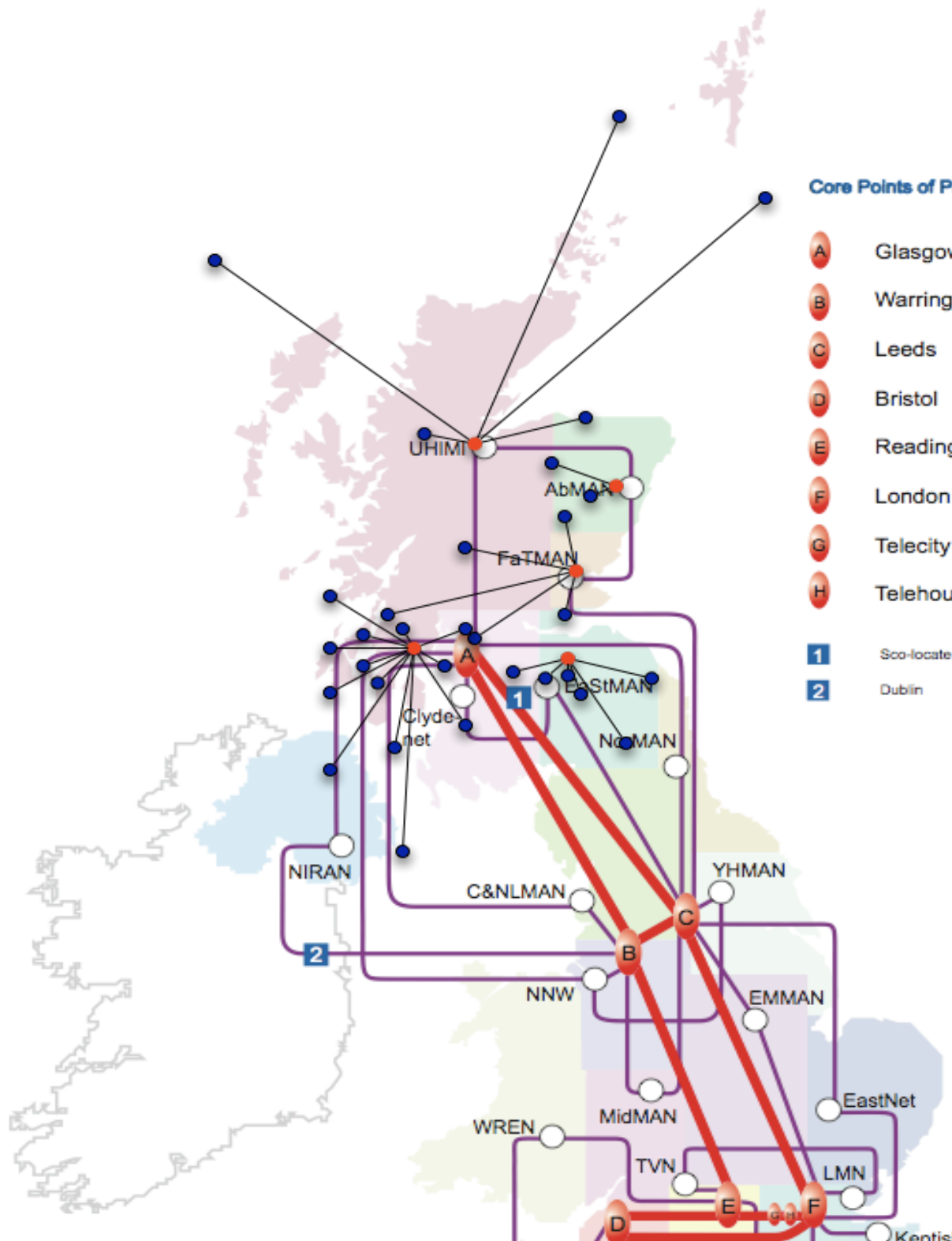
- All Scottish LAs connected
- connections 45Mbps - 1Gbps
- Microwave, SDH and Ethernet links
- Managed router in each LA data HQ
- Used for Internet access for Education and Local Government
- IP service provided to each LA



# Scotland - SSDN Interconnect - Schools, Libraries and Local Government







**Core Points of Presence**

- A** Glasgow
- B** Warrington
- C** Leeds
- D** Bristol
- E** Reading
- F** London
- G** Teleticity (based in London)
- H** Telehouse (based in London)
- 1** Soo-locate
- 2** Dublin

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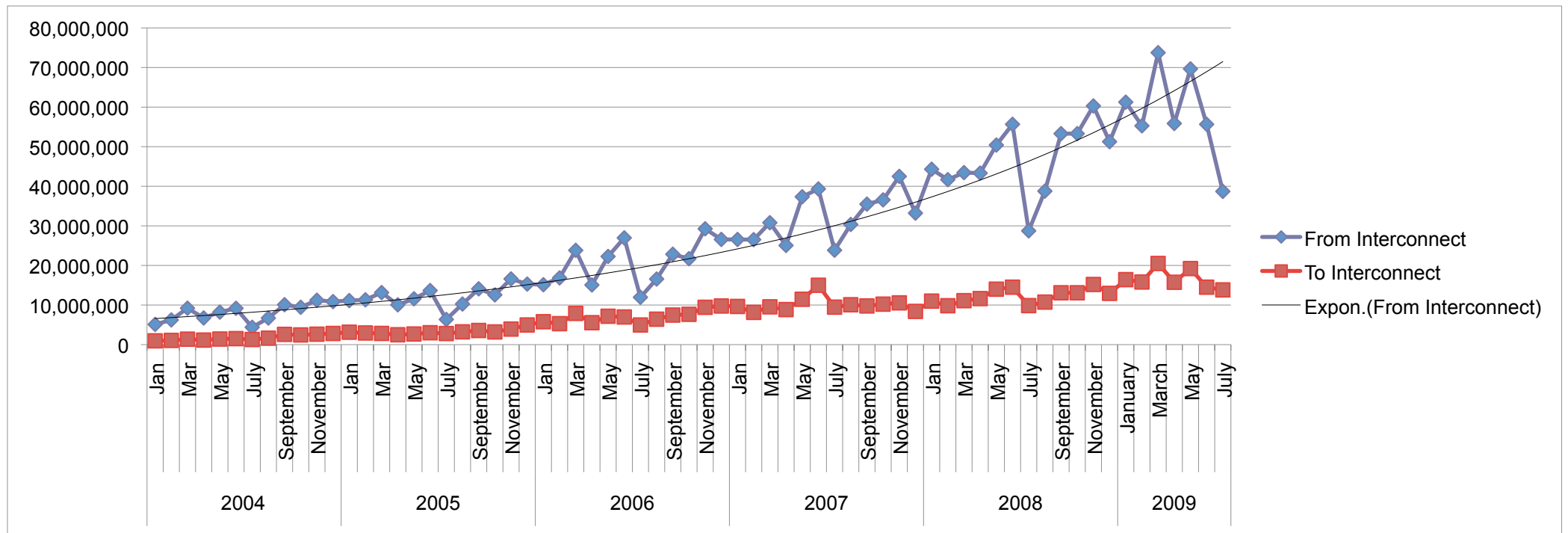
# SSDN Interconnect

- 100% Scottish LAs connected
- connections 45Mbps - 1Gbps
- Microwave, SDH and Ethernet links
- Managed router in each LA data HQ
- Used for Internet access for Education and Local Government
- IP service provide to each LA

# About SSDN Interconnect Traffic Trends

- SSDN Interconnect traffic trend is upward
- Traffic is a product of end user activity
- Early predictions have been realized
- Future Trends are likely to follow previous
- Increasing use of real time traffic (VC/ Voice and Video) are significant factors
- School classroom activity traffic is the dominant influence on measures

# Traffic Trends Jan 2004 – present day

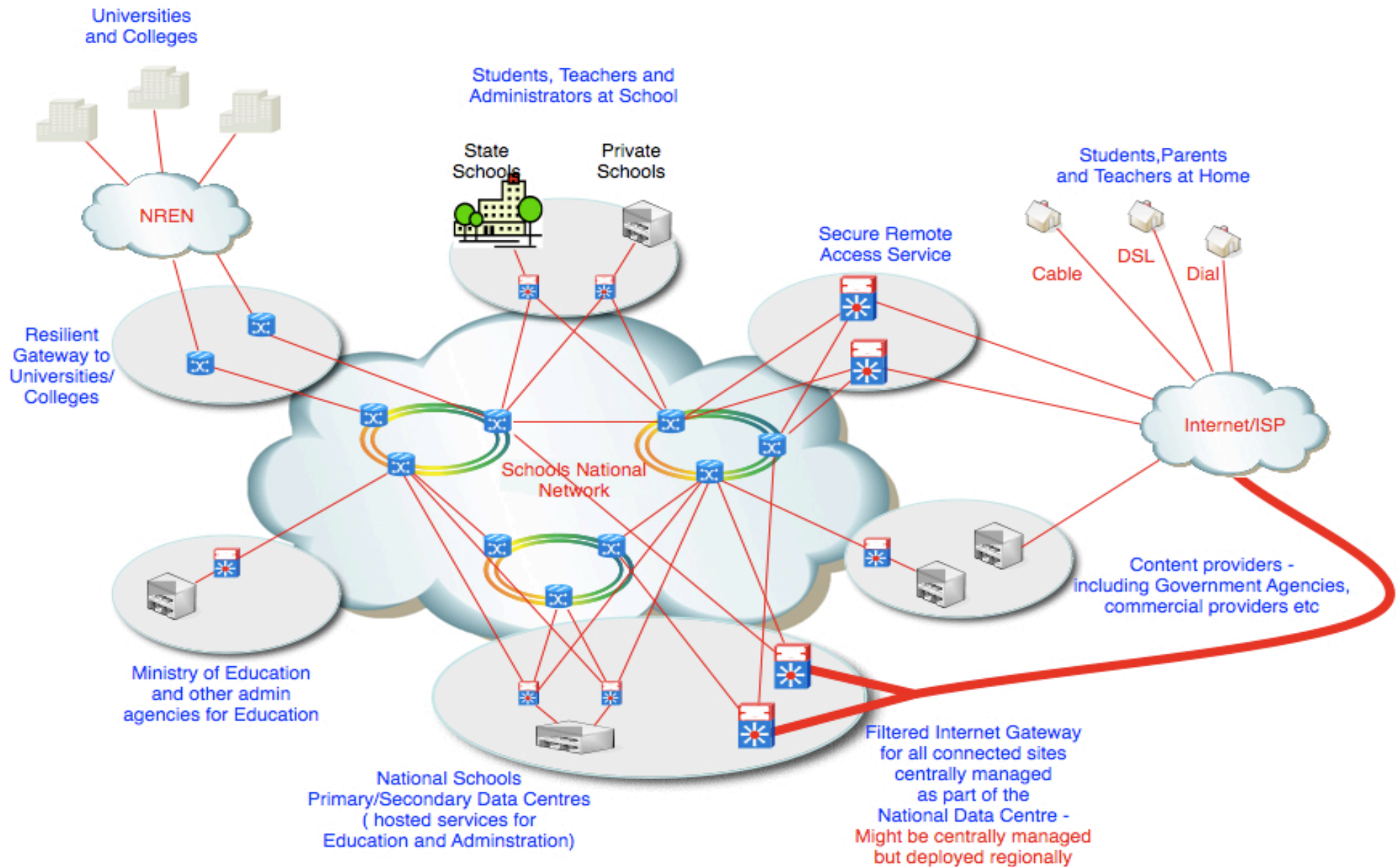


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## Glow Interconnect V2

- Initial Contract for 3 years
- Extended for a further 2 years
- Re-procured in 2008 – V2 in service now
- Increased to Bandwidth to LA's
- Cisco MPLS network connecting the LA's to the JANET core network







# SSDN Content Delivery Network

Jim Buchan

Vertical Solutions Architect

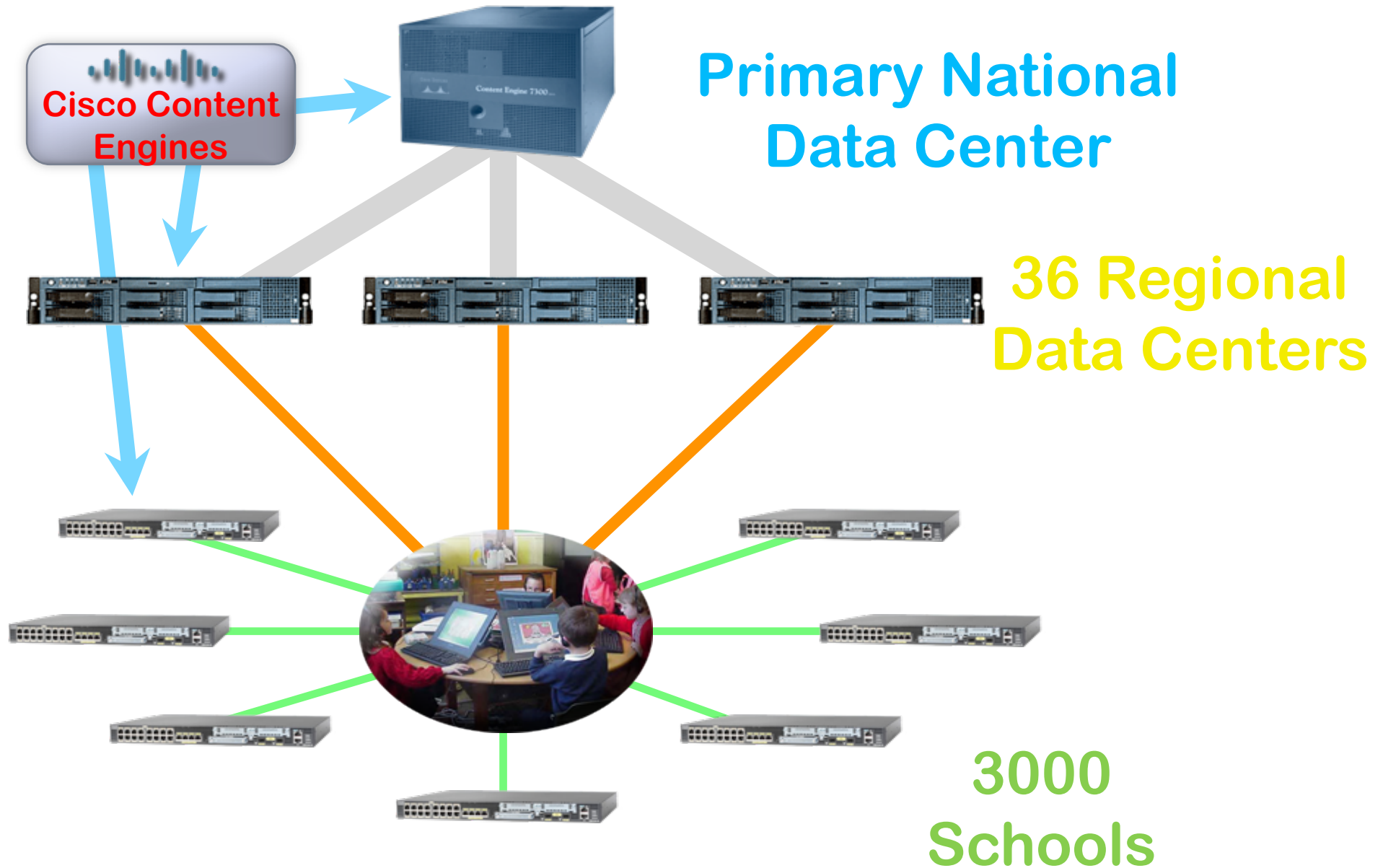
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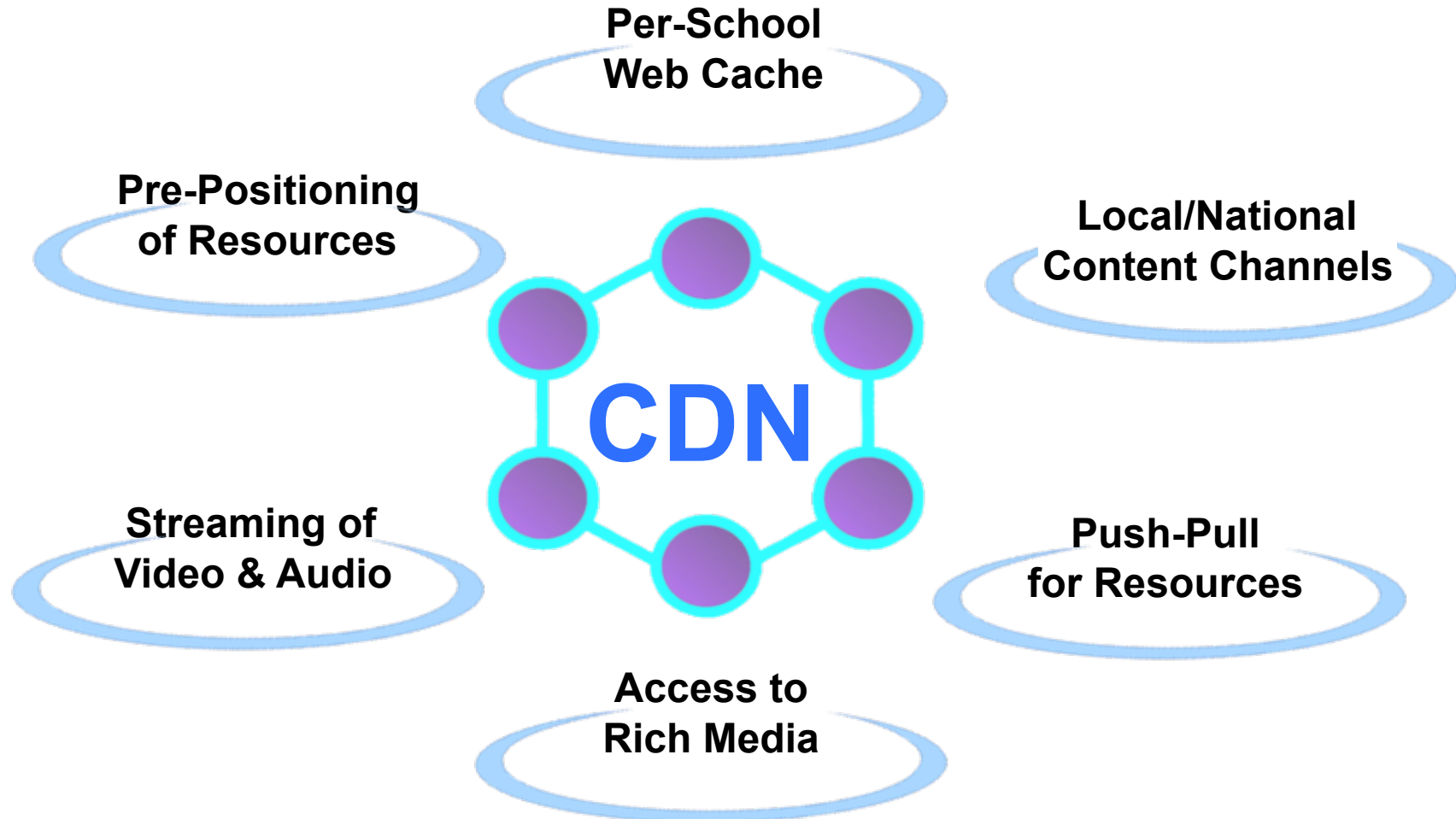
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# CDN functions



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## CDN - steps to implement

Procurement/Delivery – 6 months

Security Implications - workshops

Technical Training for LA staff and teachers

Physical rollout and configuration of equipment



**CISCO**

# Overview of Glow – the user experience



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# SSDN Project



Alan Kay

“The best way to predict the future  
is to invent it!”

*Alan Kay (1971)*

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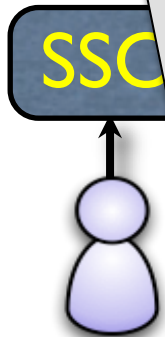
# SSDN Project

- Culmination of 10 years of development work in Scotland

# Glow Internal

**SSO = Single Sign On  
Service**

**Based on Oracle Core ID -  
once a user has logged in  
via User Name and  
Password, all Glow services  
can be accessed without  
any need to login again**



# Glow Internal

DIR

The Glow Directory is a core service  
Containing information about users including contact details and the users Role - e.g. pupil, teacher etc.

SSC



# Glow Internal

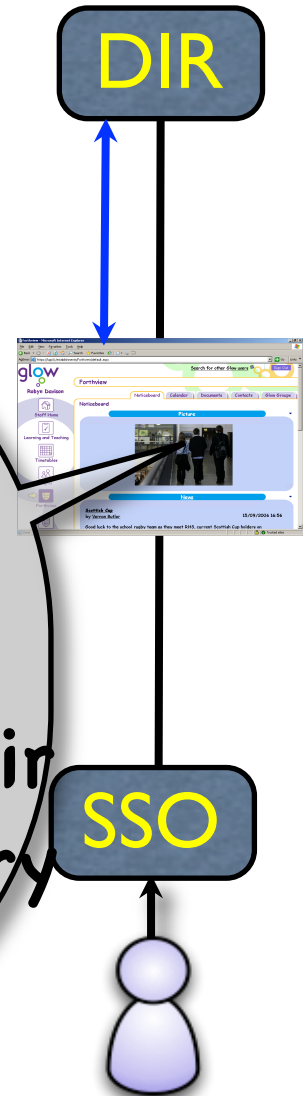
DIR

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# Glow Internal

Portal  
the portal is  
configured for each  
user according to their  
profile in the Directory





Robyn Davison

Search for other Glow users Sign Out

Forthview

Noticeboard

Calendar

Documents

Contacts

Glow Groups



Staff Home



Learning and Teaching



Timetables



Pupils



Forthview



Noticeboard

Picture



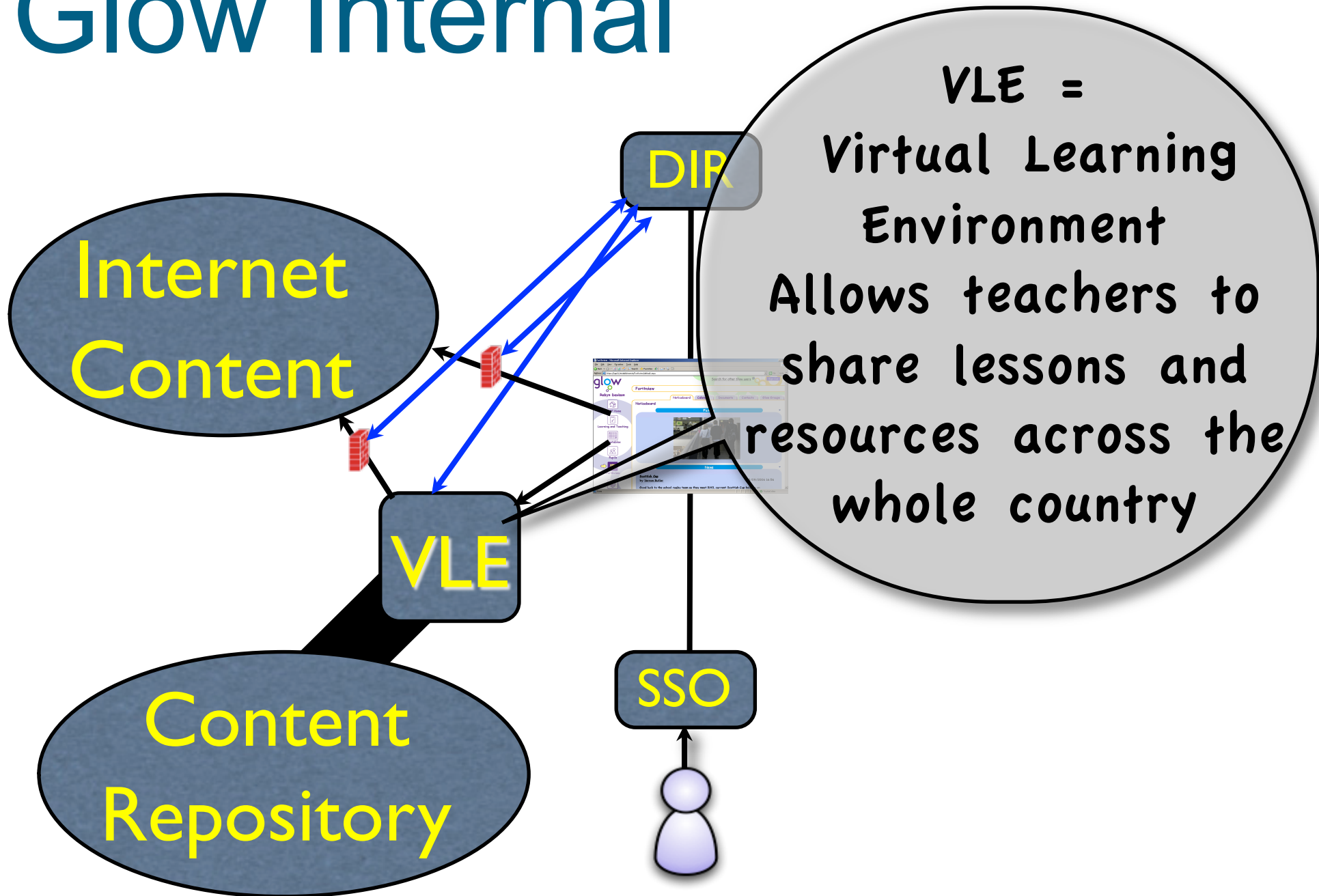
News

Scottish Cup by Vernon Butler

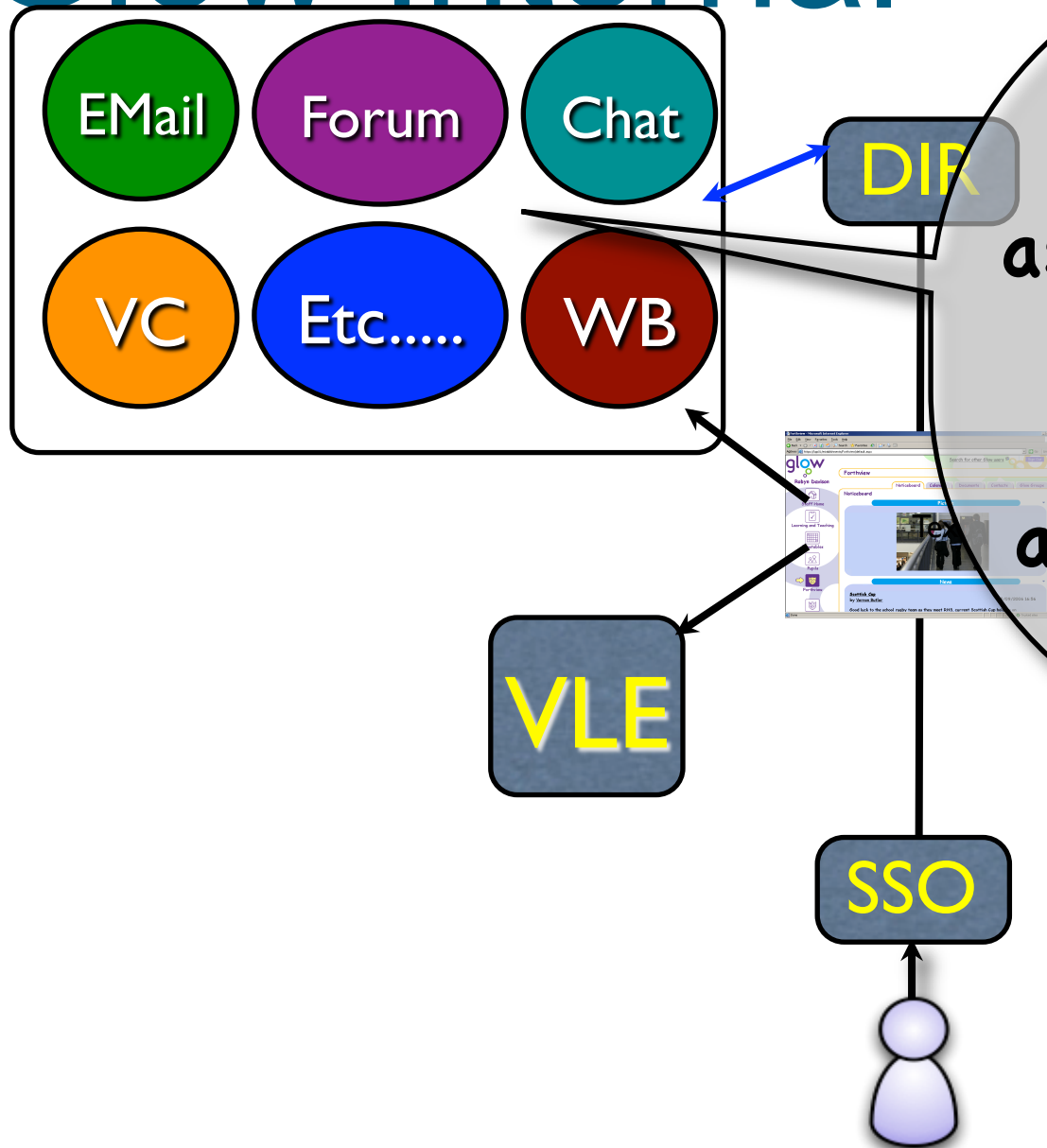
15/09/2006 16:56

Good luck to the school rugby team as they meet RHS, current Scottish Cup holders on

# Glow Internal

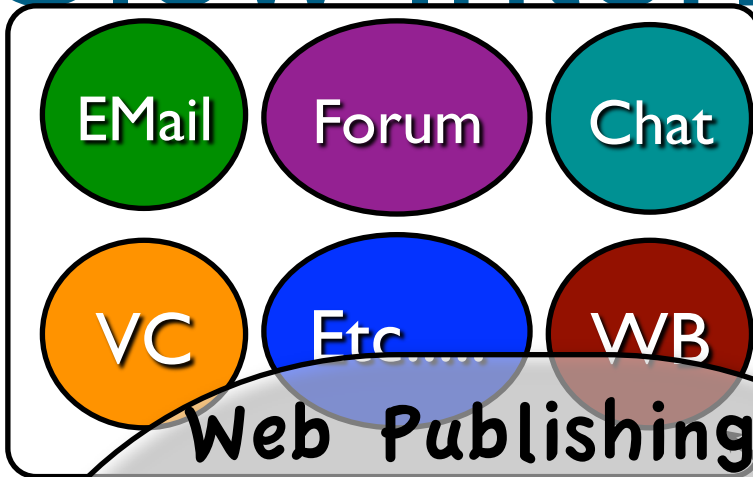


# Glow Internal



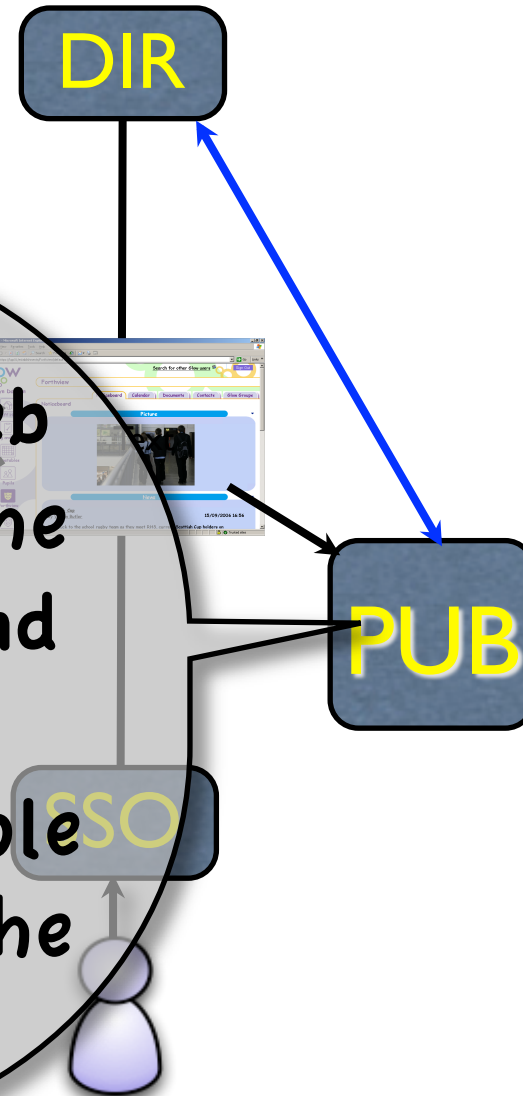
Collaboration:  
Real time and  
asynchronous. Range of  
tools which can be  
made available  
according to the users  
role

# Glow Internal

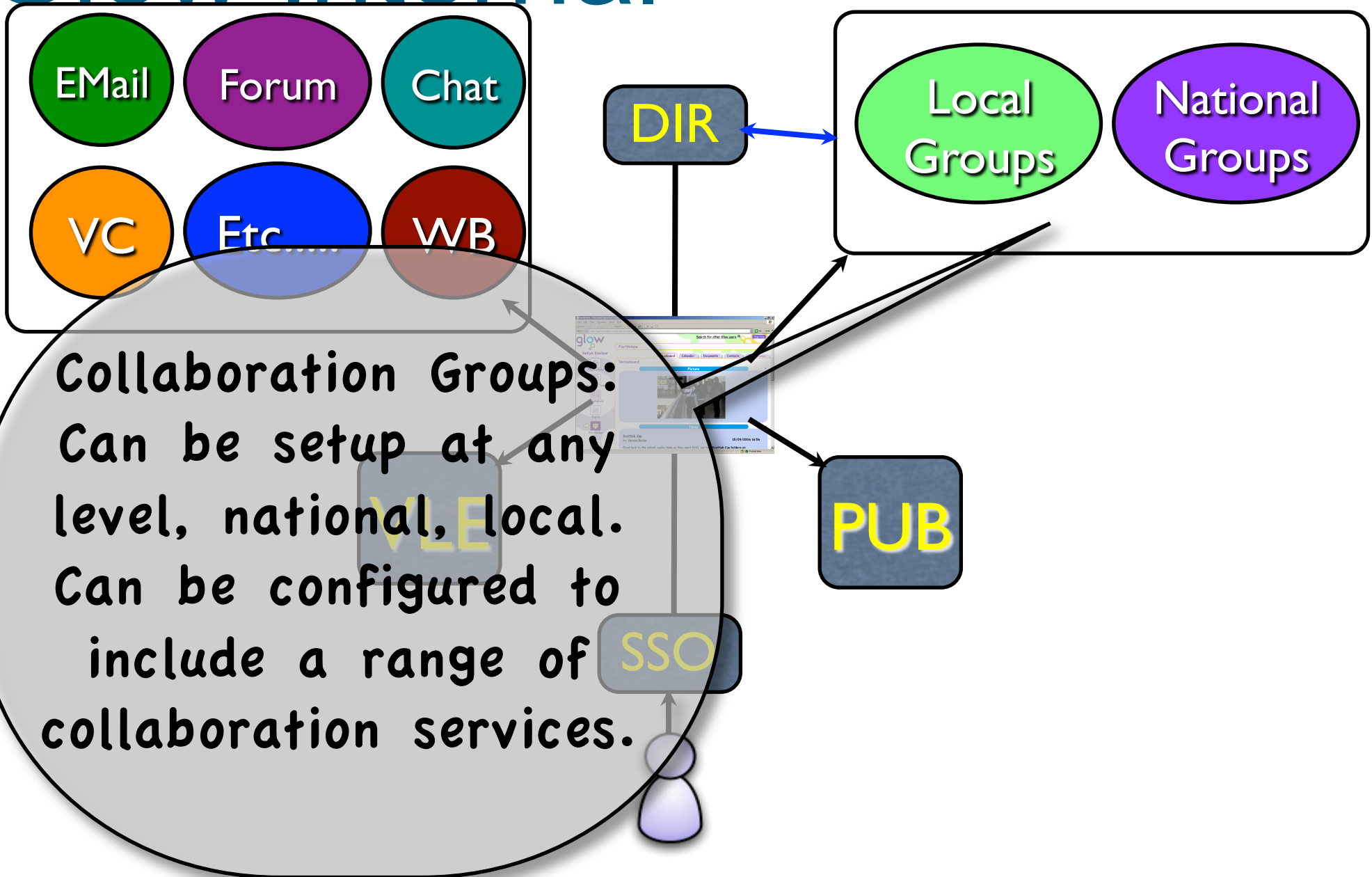


## Web Publishing:

User can publish web pages both within the Glow environment and to the Internet - according to their role and permissions in the directory



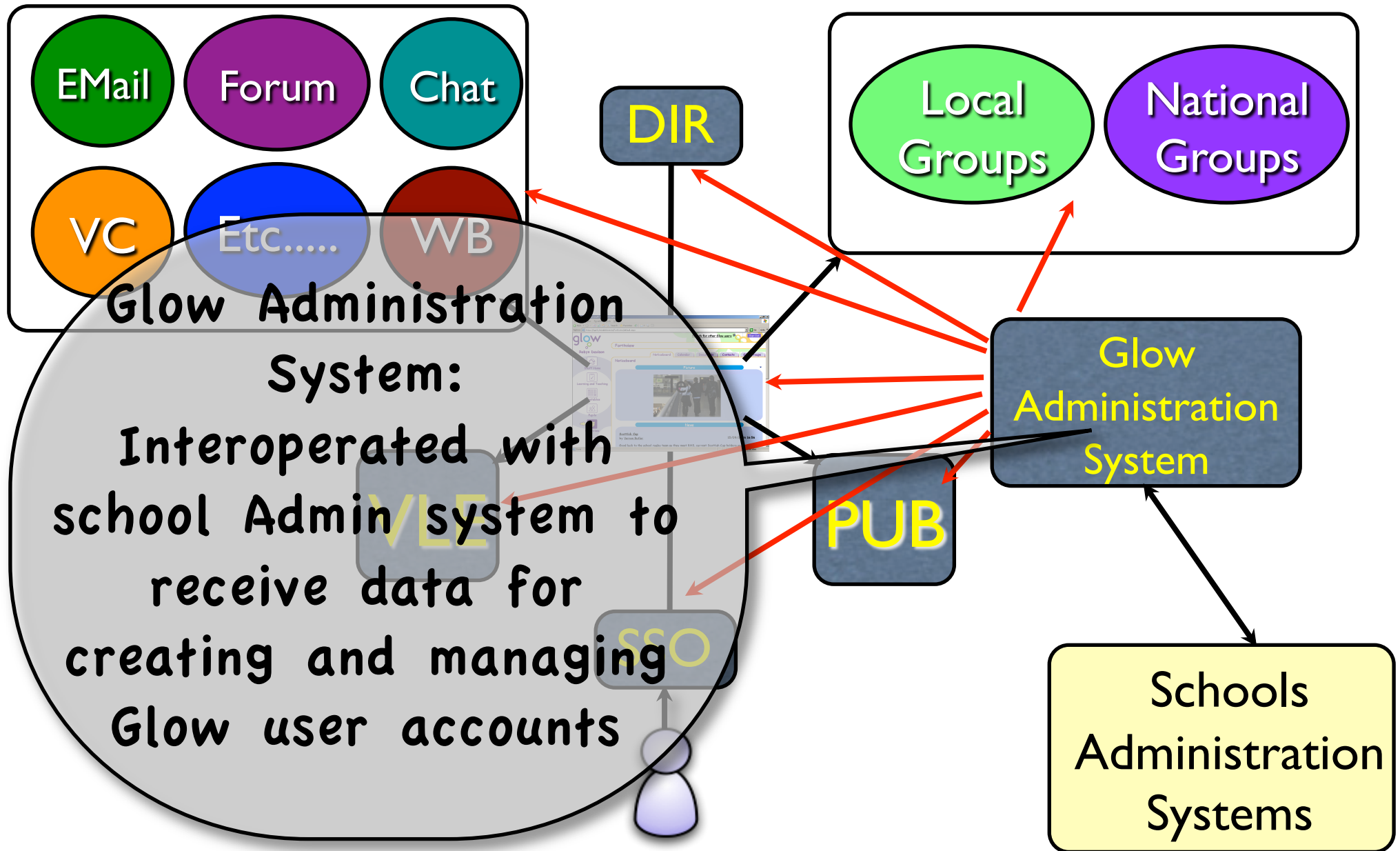
# Glow Internal



**Collaboration Groups:**  
Can be setup at any level, national, local.  
Can be configured to include a range of collaboration services.

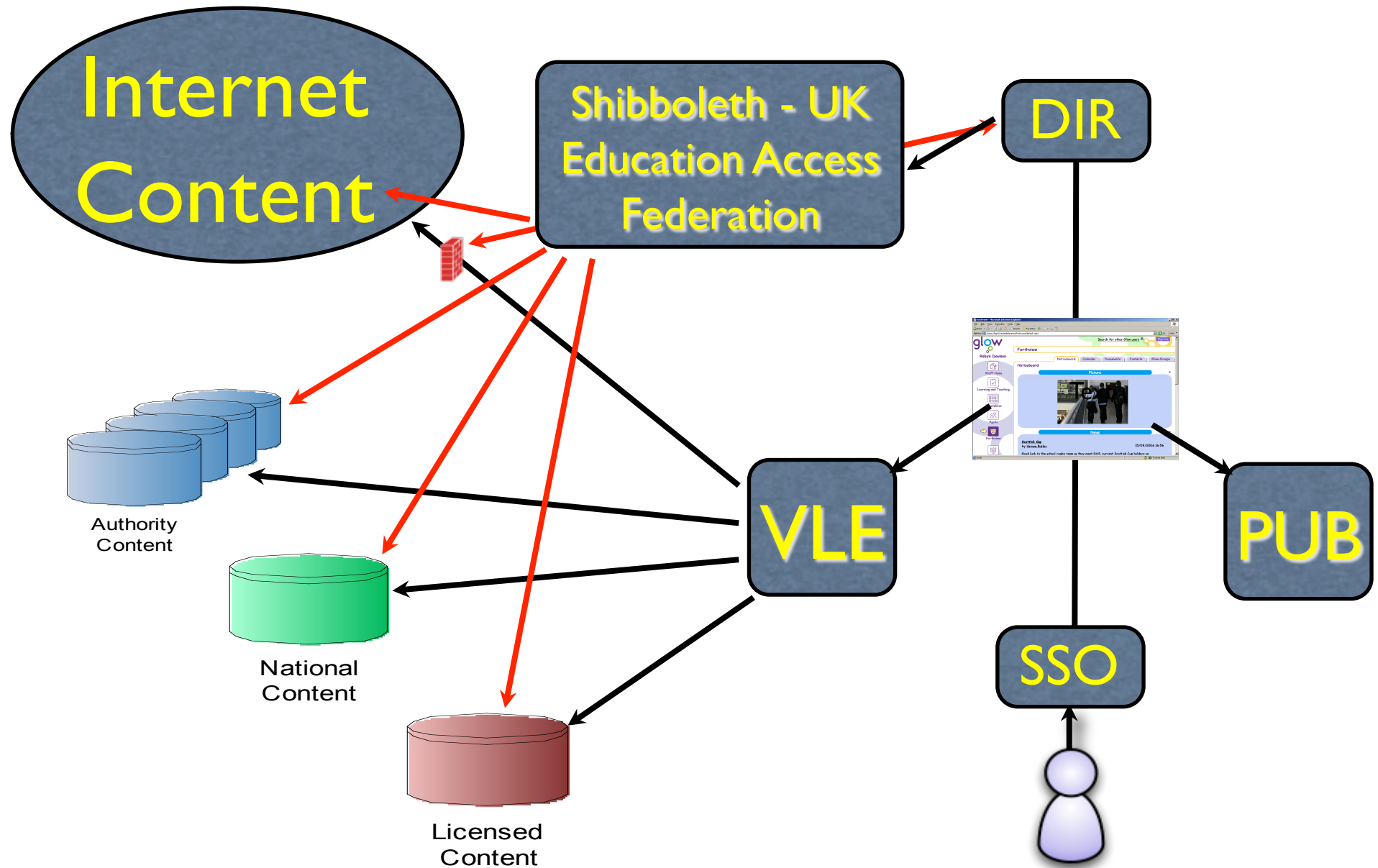


# Glow Internal





# Power to the People Authentication



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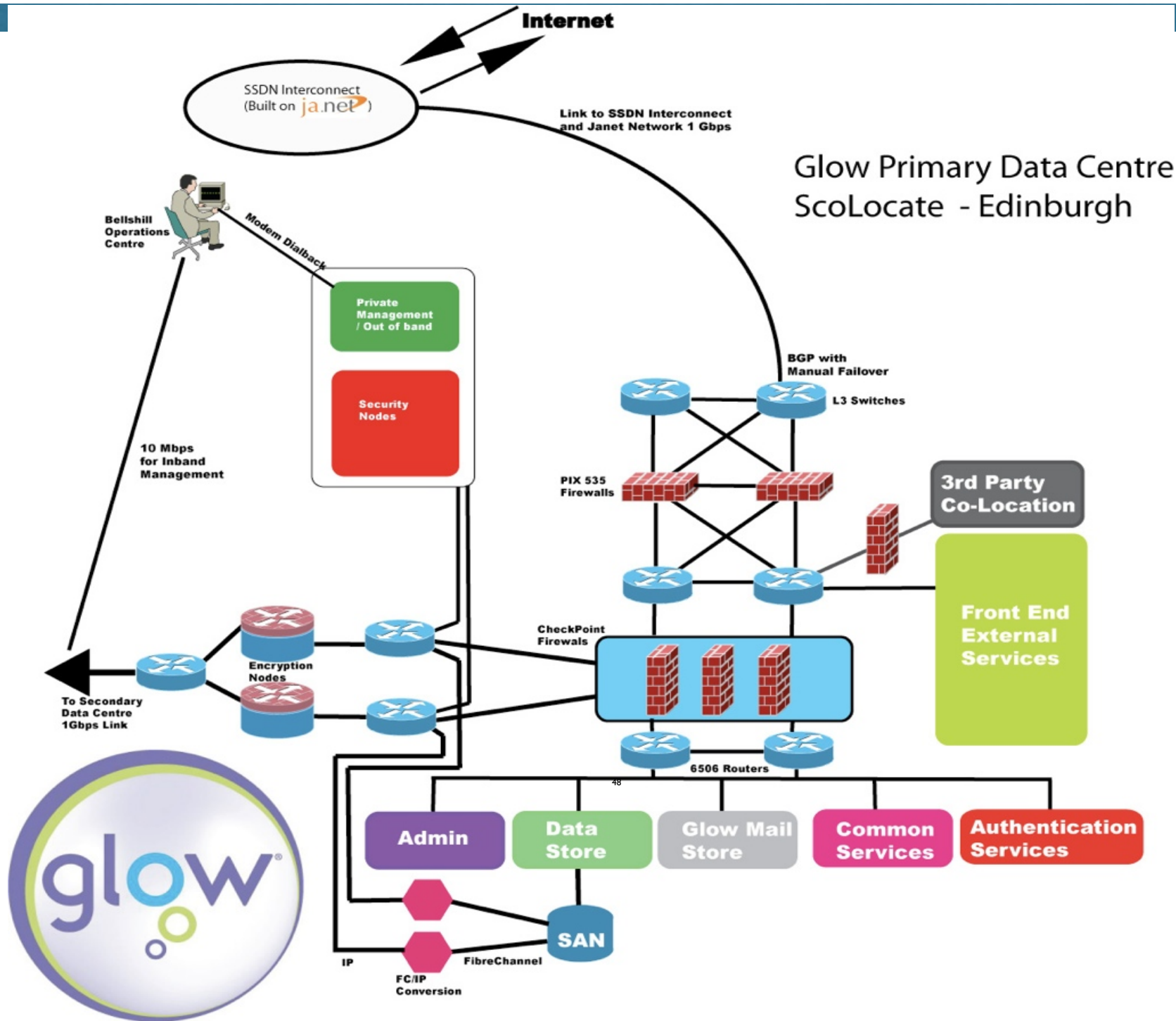
# Glow Components

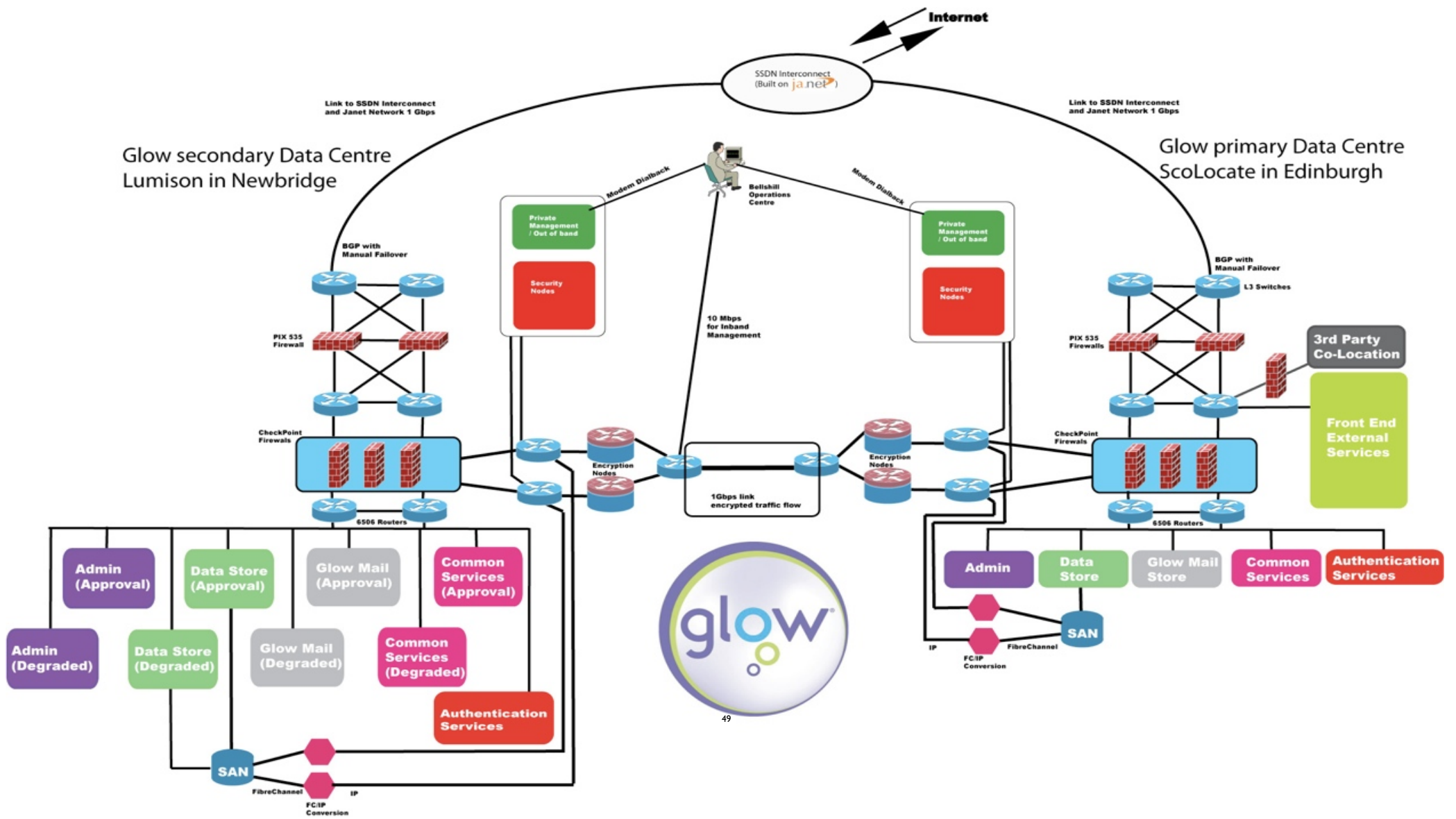
- Web Based
- Single Sign On
- Collaborative applications
- National/local Glow Groups
- Document Sharing
- Web Publishing
- VLE - pan Scotland
- Account Management/School MIS
- Federated access using Shibboleth

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# Glow Data Centers

- All services hosted in data center
- services designed for 99.95% availability
- 24/7 operational access
- No single points of failure
- Protection against intrusion and virus attack
- Connectivity – Glow (SSDN) Interconnect
- Secondary data center - hot standby





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# Case Study available

**“The secret of Glow’s success is simple: the learning platform was designed first, before any thought was given to the design of the national infrastructure. The application layer was thought out first, and the infrastructure necessary to meet the needs of the application layer was then designed. In terms of implementation, the network was built first, with the learning platform coming along only after the network was completed, but it is important to understand the rationale behind the order in which the major components were planned.”**

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Questions?



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