Grid based
Overlay Network Service Issues
for Future Internet

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1. Definition of Overlay Network

An overlay is a set of servers deployed across the Internet

By David Clark

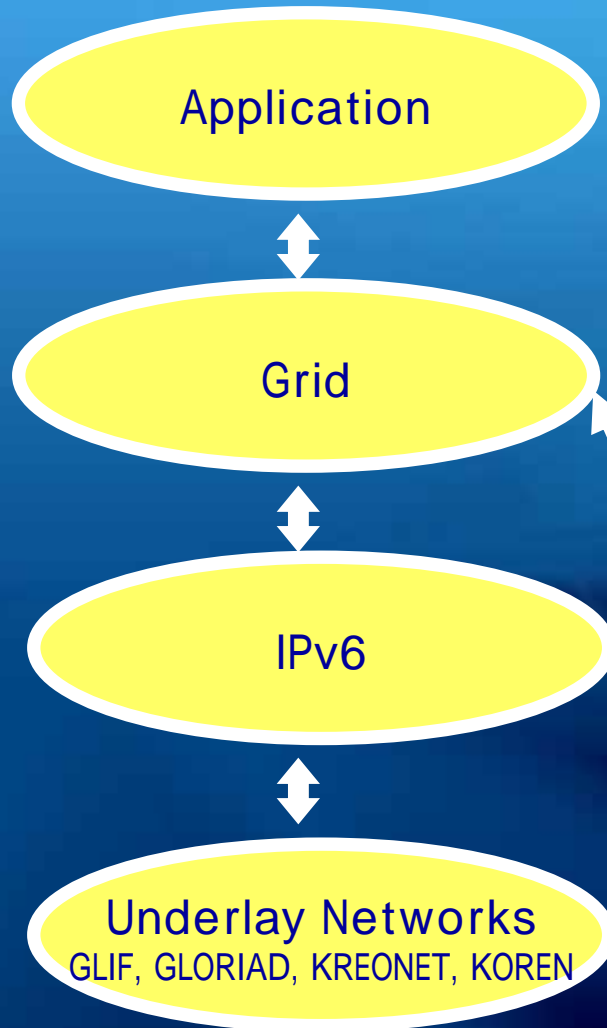| Caching Support for Content delivery	Delay minimizing routing	Enhanced Security	Functional extensions
CDN	Overlay Routing	VPN	PlanetLab

Annex 1: Definitions of Grid

Grid is a type of parallel and distributed system that enables the sharing, selection, and aggregation of geographically distributed "autonomous" resources dynamically at runtime depending on their availability, capability, performance, cost, and users' quality-of-service requirements.
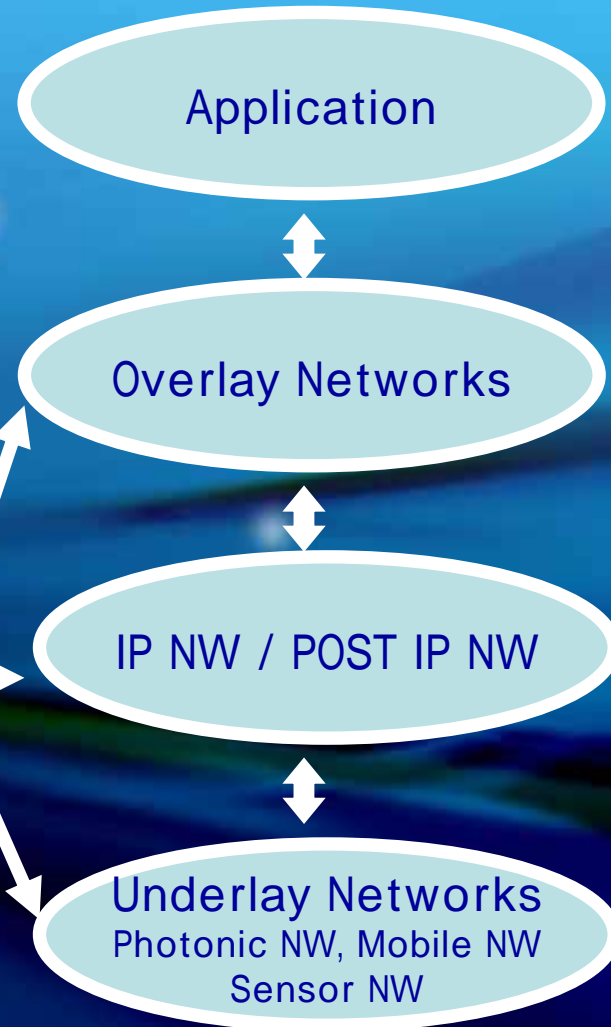

If we make Grid computers to join in overlay routing process…

Annex 2: Grid and Overlay network

Grid Computing Model

Overlay Network Model
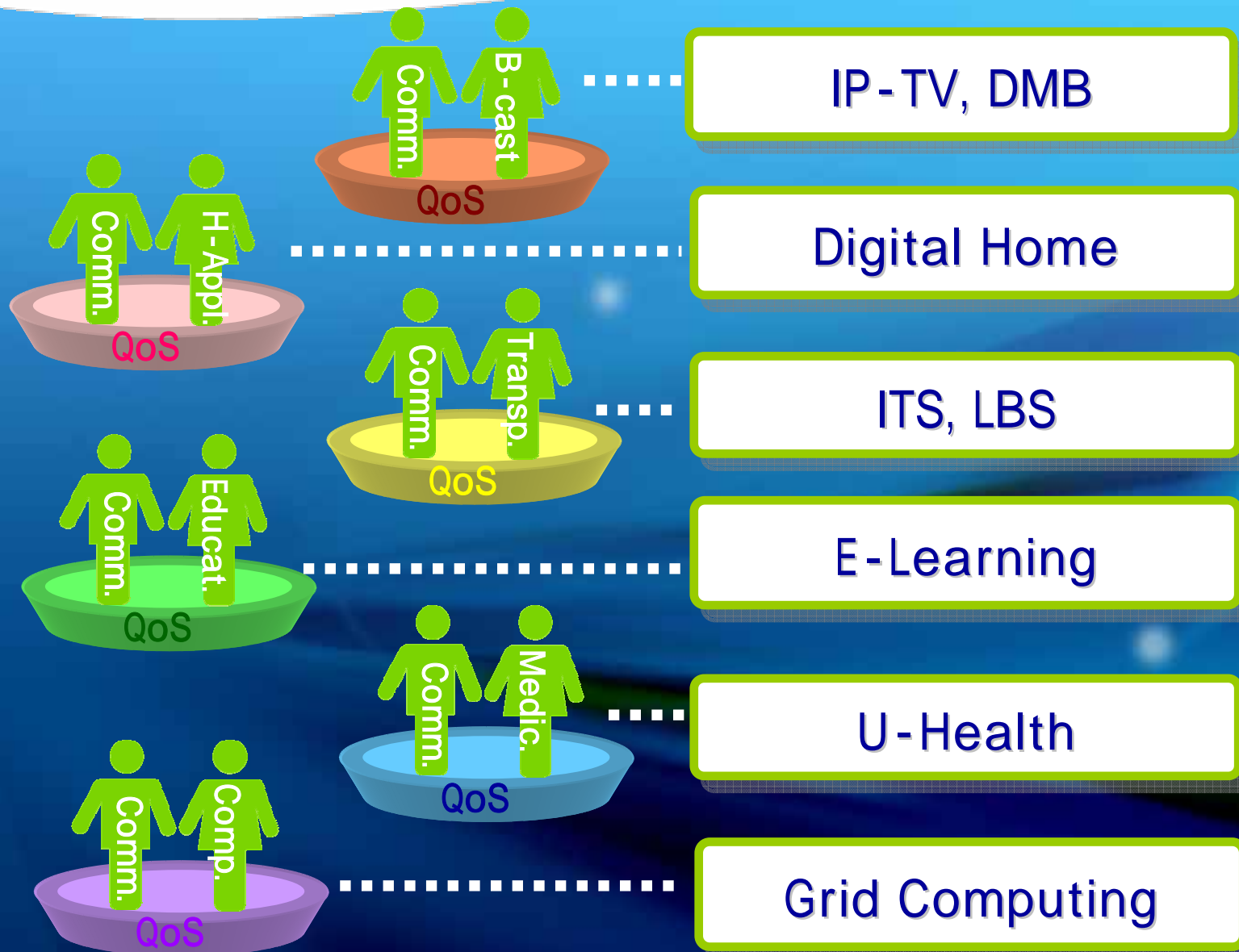
Application

Application

UCLP

G-LAMBDA

...

Grid

Overlay Networks

GOUNI   OUNI

IPv6

IP NW / POST IP NW

Multilayer Control Mechanism

Underlay Networks
GLIF, GLORIAD, KREONET, KOREN

Underlay Networks
Photonic NW, Mobile NW
Sensor NW

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Global
Scheduling(?)
for QoS

**Overlay
Network**

Over
Provisioning
for QoS

Gateway

**User Controllable
Network**

Router

Internet

More
Segmentation
for QoS

Logical Network

Switch
or Bridge

**PSTN,
Ethernet**

Physical Network

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The more converged application emerges the more differentiated QoS requires

Comm / B-cast — QoS .... IP-TV, DMB

Comm / H.Appl — QoS .... Digital Home

Comm / Transp. — QoS .... ITS, LBS

Comm / Educat. — QoS .... E-Learning

Comm / Medic. — QoS .... U-Health

Comm / Comp. — QoS .... Grid Computing

3. Requirements for Overlay Networks

Real E2E Guaranteed QoS Network Service ➡

On **Real Time** Demand QoS Network Service ➡

User Customized QoS Network Service ➡
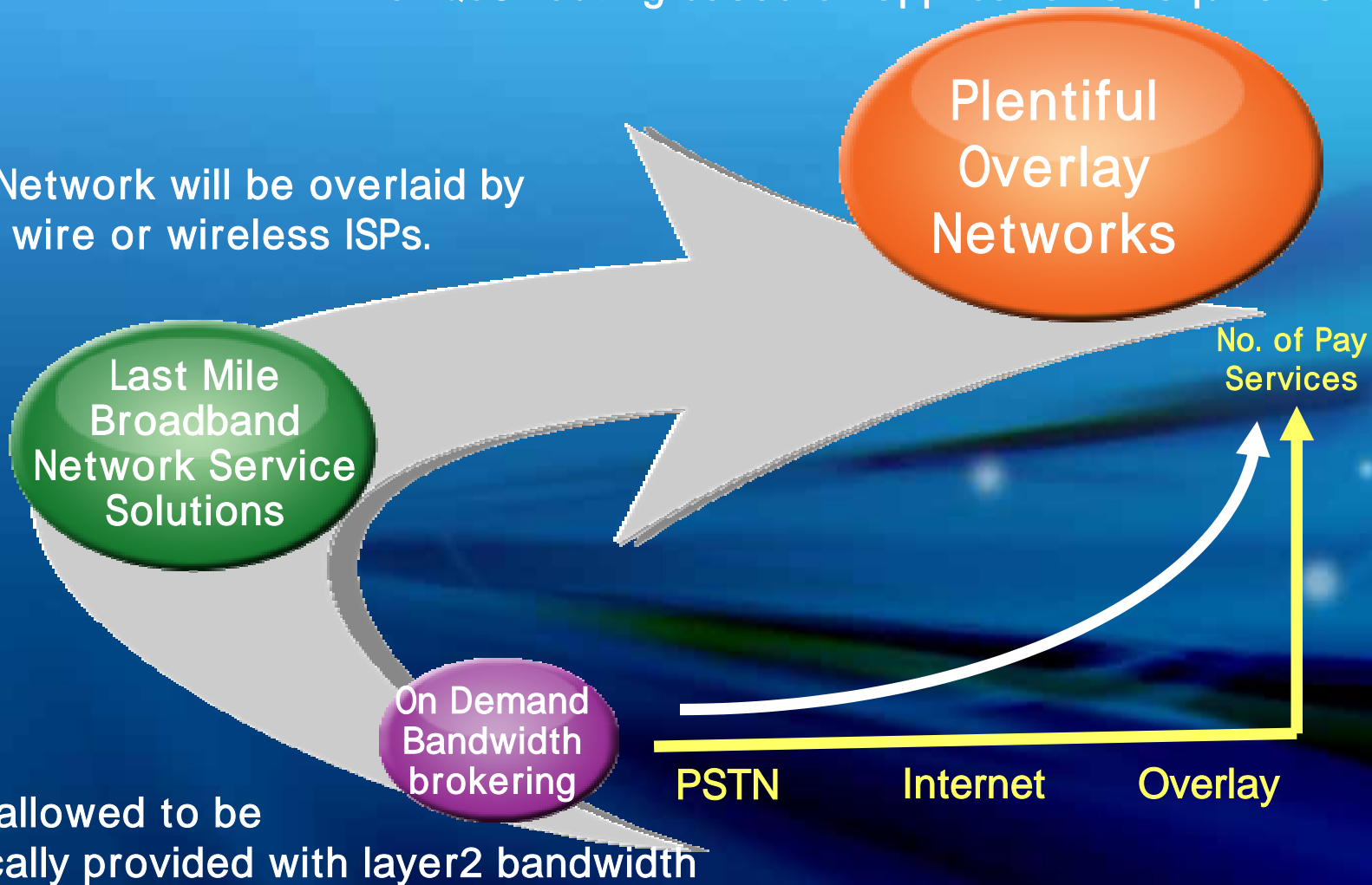
Application (User) Controlled, Real End to End QoS Provisioning

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4. Impacts on Future Internet(1/4)

(Home) Servers will impersonate (edge) router
for QoS routing based on application's requirement .

Plentiful Overlay Networks

Private Network will be overlaid by
multiple wire or wireless ISPs.

Last Mile Broadband Network Service Solutions

No. of Pay Services

On Demand Bandwidth brokering

PSTN   Internet   Overlay

User is allowed to be
dynamically provided with layer2 bandwidth

4. Impacts on Future Internet(2/4)

Related traffic marking (or encapsulation) for QoS routing

1. *Higher and further from layer 2 and Telco switch .*

2. *Switching devices (PSTN) -> Routers (Internet) -> Home server or personal computer (Overlay network)*

3. *MAC address based routing -> IP address based routing -> URL based routing.*

4. *TOS based routing -> (static) Policy based routing (provider) -> (volatile) Pay- will based routing*

4. Impacts on Future Internet(3/4)

Related Congestion control, Accounting, Provisioning.

1. Best effort service (like trail)->Relatively guaranteed service (like road) ->absolutely guaranteed service (like express way)

2. Packet-drop based Congesting control -> (user click) access-control based congestion control

3. the fixed rate system - >the (exactly) measured rate system ->the customer satisfaction rate system

4. (static) Over provisioning ->Dynamic allocation based (over) provisioning

4. Impacts on Future Internet(4/4)

Related the last mile broadband service problem.

1. *Near soon, wireless ISPs try to invade private network with high speed wireless service as a last mil solution.*

2. And then, competitive wire ISPs will announce the new service 'optic cable to the PC on the desk'.

3. Campus or enterprise networks will be fallen into the special application of overlay networks using VoIP, IPTV and so on.

4. *because the cost for the early adapting of the cutting edge technology is too expensive to catch up with*

5. Some lessons from Grid Project

1. The effort for global adaptation is first, high tech. development is the next like Internet.

2. The extension of horizontal convergence tends to make the necessity of vertical convergence to increase.

3. The way that allowing application to choose express way among various kinds of paths seems to be easier and cheaper than current way that IP filtering at every routers for QoS.

4. Without solving the last mile problem, almost of advanced network services will be seriously limited.

Thank you for your attention.