



International Telecommunication Union

Grid Computing: Telco Perspective

Rick Schlichting

Director, Software Systems Research

AT&T Labs–Research, USA

ITU-T/OGF Workshop on Next Generation Networks and Grids
Geneva, 23-24 October 2006

Personal Perspective

- 25 years of work in distributed computing
- 1980s and 90s: heterogeneous distributed computing, meta-computing
 - Schooner: heterogeneous RPC
 - Joint work with NASA on NPSS project
 - Joint work with Hitachi on *heterogeneous simulations*
- Organized panel on dependability and grid computing at DSN 2002
- Participant in GGF meetings and in Grid/Telco focus session at Supercomm 2004

Outline

1. Possible Telco roles in grid computing
2. Grid computing at Telcos
3. AT&T Vision
4. Conclusions

Telco Grid Roles

Based primarily on draft report “Telco Roles in the Global Grid” by the Telco-CG at GGF/OGF.

Possible Telco Roles

Three possible roles identified for telcos:

1. *Enabler* for grid computing
 - Provide networking, storage, etc resources for customer grids.
2. User of grid *internally*
 - For running both internal and customer facing applications.
3. Managed grid *provider*
 - Provide managed grid computing as a service to customers.

Enabler

Basic communication services:

- Provide connectivity for customer grids (*Enterprise Grid*) or between a customer and grid computing providers (*Partner Grid*).
- Grid traffic is often different from “normal” traffic, i.e., requires higher bandwidth or lower latency (QoS).

Advanced communication services:

- Bandwidth on demand (e.g., optical lambdas).

Other services:

- Virtualized storage services (on-demand storage).
- Computing resources (on-demand CPU cycles).

Challenges

Communication services are the core business, but ..

1. Cost issues:

- Can higher QoS be provided at a reasonable cost?
- Can bandwidth on-demand be provided profitably?

2. What is the impact of (dedicated) grid computing connections on the network?

3. Marketing:

- Most academic and research grids have built their own networks rather than buying connectivity services from telcos (only fiber from telco).
- Can telcos demonstrate the benefits of using managed connectivity?

Internal use

Telcos are like any other businesses

- Payroll, e-commerce, self-service,

but also have specialized applications

- Billing, telephone fraud detection, network planning
- Traffic analysis (e.g., performance monitoring, attacks, worms, etc)

Some applications are for internal use only while others are to support customers (e.g., company web site).

Some applications compute/data intensive; interactive services load intensive.

Grid computing has the potential to improve and optimize many of these applications.

Internal use of grid computing may make it easier to sell managed grid computing to business customers.

Grid Service Provider

Telco provides grid computing as a managed service.

- Computing, storage, and communication resources and their management.
- Grid applications management.

Multiple possible approaches:

- Manage customer's private grid (customer's resources).
- Shared grid with only telco-owned resources.
- Shared grid with resources owned by third parties (including customers) - brokering capability.
- Combinations of the above

Suitability for role:

- Telcos understand how to manage large complex networks
- Can take advantage of their network (and other) resources.
- Builds on other managed services provided by telcos.

Challenges

Security and trust barriers:

- Both data and algorithms of customer grid applications are often confidential.
- Executing on resources owned by somebody else may be problematical
- Sharing of resources might be an issue.

Learning of new technologies:

- Sales, engineering, and operations.

New communication requirements (same as in enabler role)

Heterogeneity:

- OSs and hardware platforms used by different customers.
- Grid platforms used by different customers (Condor, Globus, Platform Computing, Sun Grid Engine, United Devices, DataSynapse, etc).

Marketing: Especially for academic and research grids.

Grid Computing at Telcos

Based on publicly available information.

Telco activity at GGF

GGF sponsors (2006):

- AT&T, NTT Labs, Qwest Communications.

GGF participation:

- BT, DT, FT, Telecom Italia, Level 3, KT (Korea Telecom), KDDI, Belgacom, etc.

Published Telco Grid Efforts

British Telecom:

- Inter-Enterprise Virtual Private Grid business model. [Frank Falcon, BT, GGF 13. 2005]
- Virtual Services Platform (initially for internal use). With United Devices. [UD Press Release, 3/27/06.]

Telefonica:

- Dynamic “Services on Demand” grid platform for customer portals, statement provisioning and reporting. With DataSynapse. [EnterTheGrid.com, 10/11/05.]

France Telecom:

- Prototype grid (24 servers in Paris, Tokyo, Kawasaki) for internal IT grid. With Fujitsu. [Cellular-News.com, 4/17/06].

Telecom Italia:

- Grid-enabled CDR (call Detail Records) management applications. With GridSystems. [gridsystems.com]

Verizon:

- Provides networking for West Virginia Global Grid Exchange [Grid Today 11/8/04]

AT&T:

- Donated 8,000 miles of dark fiber to SURA (Southeastern Universities Research Association) research grid infrastructure. [Grid Today 1/5/04]

Qwest:

- Provides optical fiber for NSF TeraGrid (40 Gbps from Los Angeles to Chicago). [Grid Today 3/17/03]

Level 3:

- Provides networking for Internet2 and various university networks (used for grid computing etc).

AT&T's Vision

Based on presentation by Joe Weinman, AT&T Business Development & Planning, and other publicly available information.

AT&T current service portfolio

Connectivity:

- From local access (DSL, T1, etc) to global managed internet service (up to OC-192).
- Bandwidth on-demand.

Hosting:

- From co-location to managed servers and operating systems.
- Utility computing.

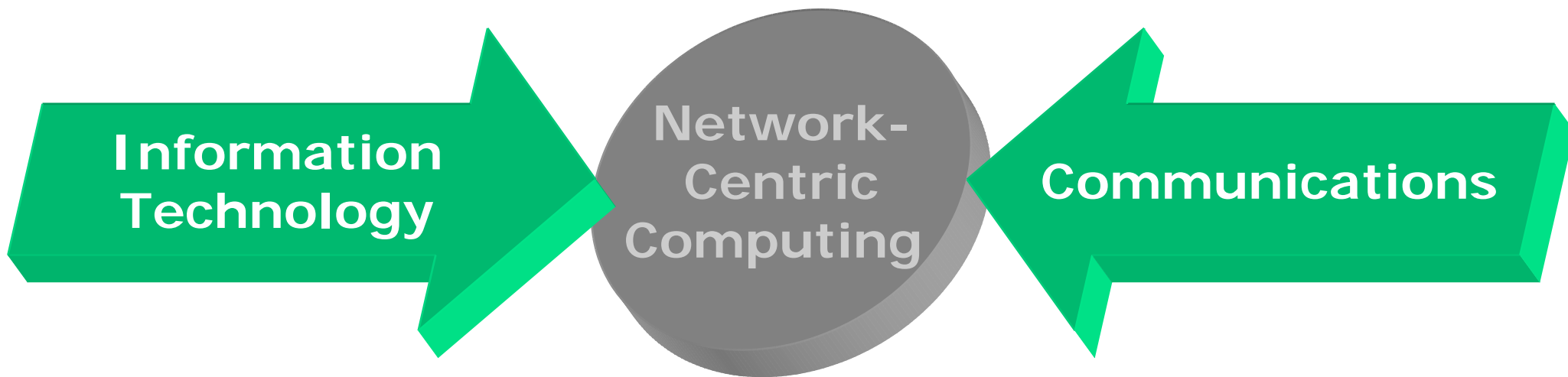
Content distribution:

- Intelligent Content Distribution Service.

Storage:

- Range of solutions.

IT & Communication Convergence

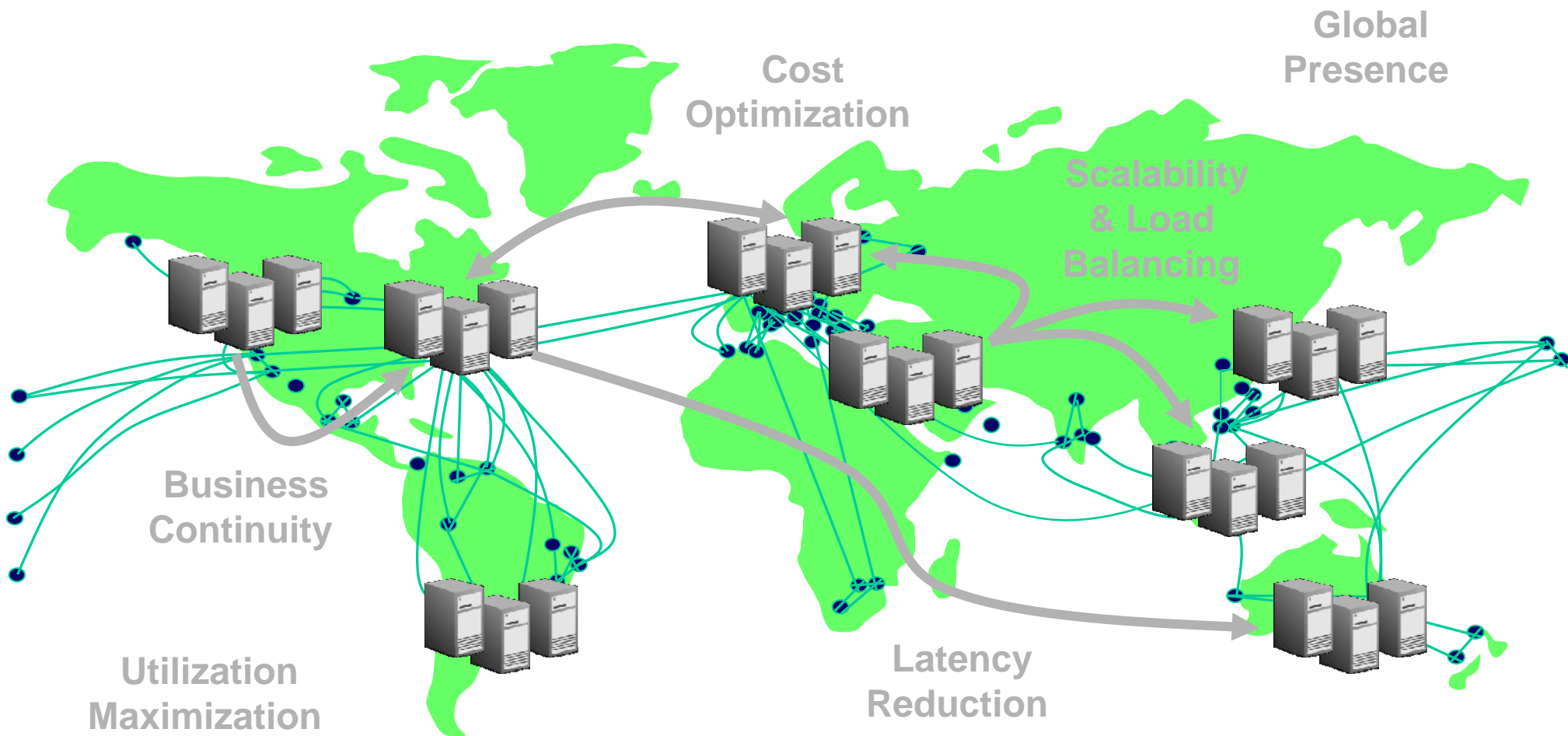


- Utility and pay-per-use business models
- Virtualization for consolidation and flexibility
- Application orientation
- Ultimate End-State: Global Utility Grid

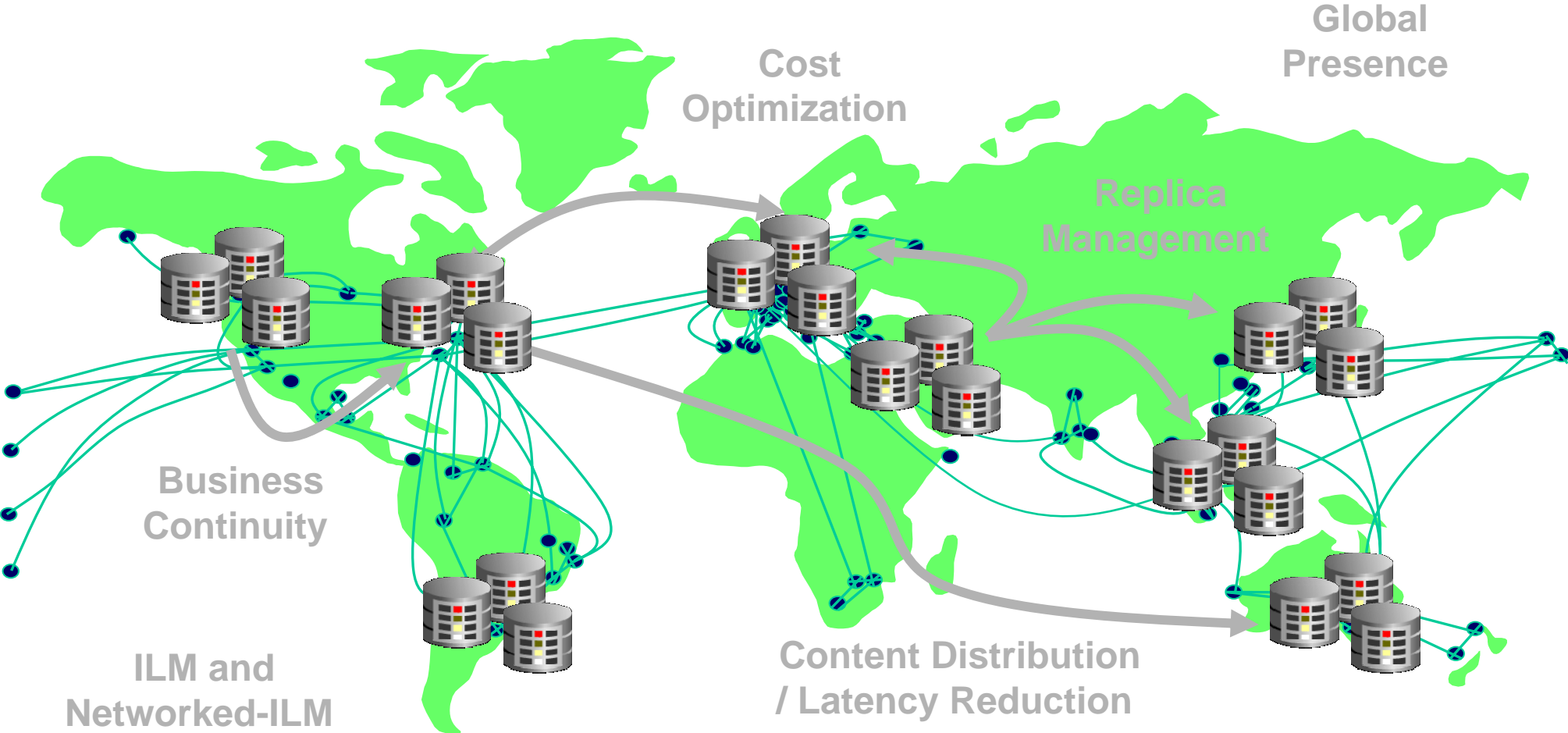
AT&T Network and Data Centers



Vision: World-Wide Utility Compute Grid

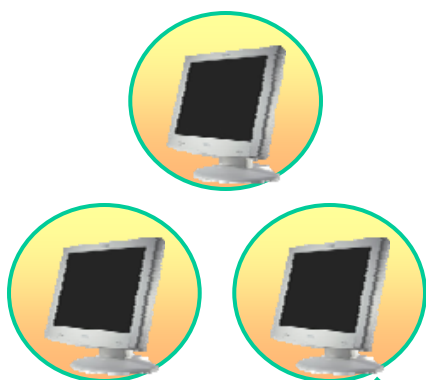


World-Wide Storage Grid

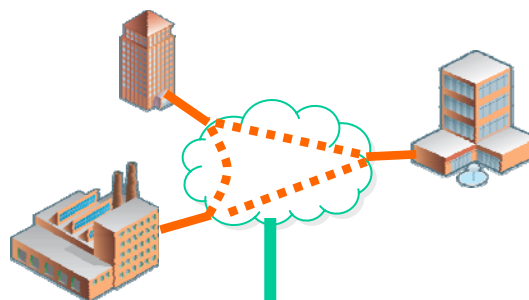


Multiple Customers

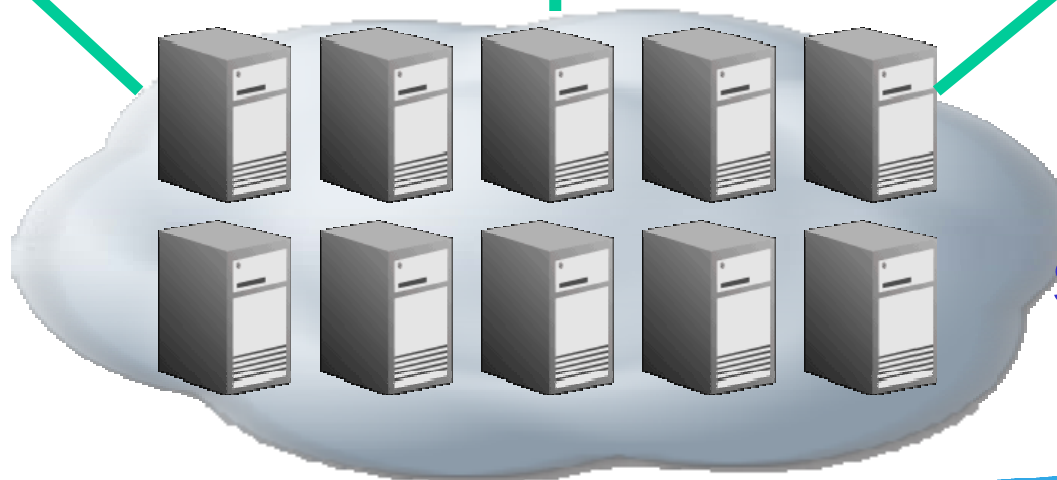
Thin Clients



Business Grid

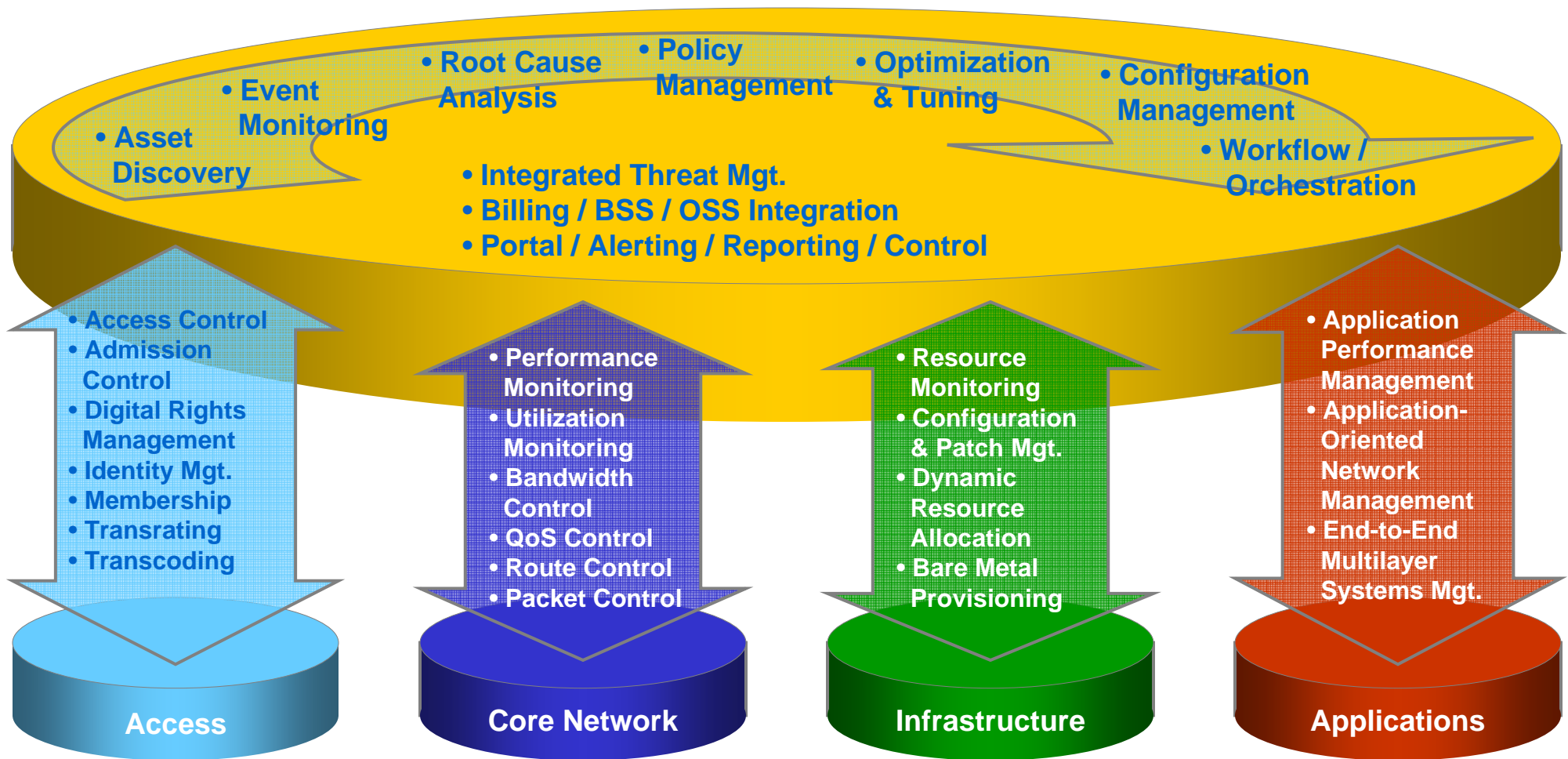


Home Video



Utility
Server Pool

Next Generation Management



Conclusions

Multiple opportunities for telcos in grids:

1. Internal use like any other business
2. Resource provider
3. Managed service provider

Adoption of grid computing at telcos slower than other verticals such as finance, pharmaceutical, and manufacturing.

Many telcos are taking steps to use grids internally and are developing visions for external services related to grids.