Convergence ?

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Network Architecture 101

- Communications networks were traditionally constructed to meet the requirements of the intended service

  - The dynamics of the human voice and the PSTN
    - Voice range covers 300 Hz to 3500 Hz
    - Poor high frequency response reduces intelligibility
    - Dynamic range of 70db
    - Delay within 400 ms
    - Limited Total Harmonic Distortion
  - Digitally, voice can be mapped with with 8000 samples per second, with each sample quantized to 256 discrete levels: 8KHz of 8 bit samples
  - The PSTN is a time switched network with a base 125usec clock pulse
  - "Digital Circuits" are derived from these time-switched 64K synchronized bit streams, using multiples of this basic service "atom"
  - Voice networks are highly constrained systems that operate to a HCF service model

Architecting for Data

- Data networks are different….
  - There is no fixed "speed" unit
  - There is no fixed minimum bit error rate
  - Loss, jitter and latency variance tolerance
  - There is no particular service model:
    - Variable speed, bandwidth, times, reliability,…

  - Data networks have variable control models, with a strong pressure to operate a lowest common denominator service model with edge-based control imposition

The "Full Service" Provider

- Operates a panoply of difference networks, each attuned to differing service requirements
  - PSTN
  - Video reticulation
  - Data circuit services (DSN,Frame, ATM)
  - Data cloud / VPN services (EtherSwitching)
  - Access networks (DSL, Cable)
  - IP
  - MPLS
  - Lambda services
  - OOB, Command and Control networks

What's wrong with this picture?

- Proliferation of special purpose networks within each "full" service provider's infrastructure – high operating costs, low revenue yields
- But all these networks are just shovelling digital packets around
  - Why does the communications service operator need to construct and operate many distinct networks?
  - If all these 'networks' are just moving packets around, why can't this be achieved within a single packet-switching plane?

Welcome to "Convergence"!

The Converged Utopia

- A small number of vertically integrated "full" service providers leveraging their underlying infrastructure investment into a high yield, high margin service delivery retail system using a single network platform for comprehensive service delivery

- Low cost, high value, strong service control, fantastic margins!

Wouldn't it be good if…

- You could operate all forms of real time and data services within a single network and a single switching plane

- Your carriage plane could be triggered to support graded service responses for each class of service usage

- You could support both high resilience high quality real time and various profiles of data services, and all points in between within a common switched network platform

- You only needed a single protocol, a single carriage architecture and a single OSS (and a single operator!) to drive the entire network operation

And wouldn't it be even better if…

- You could account for, and tariff, the end user value of delivered services rather than just switched packets

- Customers paid you for the value-add of access to differentiated value-added service solutions, rather than the marginal cost of service delivery

So is IP the Holy Grail of Convergence?

- Does IP offer the industry the reality of "convergence"?
- Can we load up the totality of all kinds of service profiles upon a single IP substrate?
- Can we run all service profiles, all security domains, all network models, upon a single IP switching plane and a single network operational platform from core through to edge?
- Will this offer the service provider enterprise more efficient cost structures with higher revenue leverage?

- Can we really reconstruct massive vertically integrated communications service providers using IP as the convergence lever?

Or is this Hopelessly Unrealistic?

- The drive for convergence of services in a single delivery system is a persistent theme in this industry:
  - Mixing Data and Voice streams with ATM
  - Mixing circuits and packets with MPLS
  - Mixing Video, Voice and Data with Triple Play

- Each new generation of carriage technology is heralded as the harbinger of a wonderous new converged era of communications service provision

What if…

- "Deregulation" was more than industry lip service to a vague political premise?
- We experience intense competition at every level of the service delivery enterprise?

In other words:

   What if we acknowledge today's reality?

- Is "convergence" still a valid concept?

The Unconverged Reality

- Deregulation, intense competition, branching role specialization at every level

- Resulting in
  - many parallel service delivery networks,
  - many network operators,
  - exposure of niche markets,
  - industry-wide duplication of activities,
  - continual exposure to inefficient resource use,
  - limited planning capability,
  - high investment risks,
  - high costs,
  - low operating margins,
  - negative returns on equity investments

The Unconverged Reality

- Deregulation, intense competition, branching role specialization at every level

- Resulting in
  - competitive discipline placed on service providers
  - market forces match supply to demand
  - pricing based on cost of supply, not value of service
  - service delivery skill specialization
  - service innovation
  - continuous industry restructuring to meet current user needs

"Convergence" vs Reality

- Voice is no longer the emperor of communications – its reign is over
  - Voice is becoming just another UDP application (and a low volume one at that)
  - Voice signalling is just a SIP rendezvous question
  - VOIP + ENUM is inevitable
    - Sooner or later
    - Somehow or other

"Convergence" vs Reality

- Triple Play time is over – BitTorrent won!

- It's a service network, not a forcing function - support the user to run what ever services they want rather than force feeding the user with a limited set of services that the service provider finds easy to deliver

"Convergence" vs Reality

- Value-Added service networks are causing value added service network providers to go value-added negative EPS

- Over the Top services now own the user

"Convergence" vs Reality

- The Internet's major leverage was always cheaper price and lowest common denominator service profiles in the network

- Arming networks with complex quality and service manipulation capabilities is a business lose
  - arming networks with adequate bandwidth is a superior strategy – QoS, NGNs and their converged ilk have lost the plot

"Convergence" vs Reality

- IP Transit is a volume-based low-value commodity activity

- IP Access is a volume-based low-value commodity activity

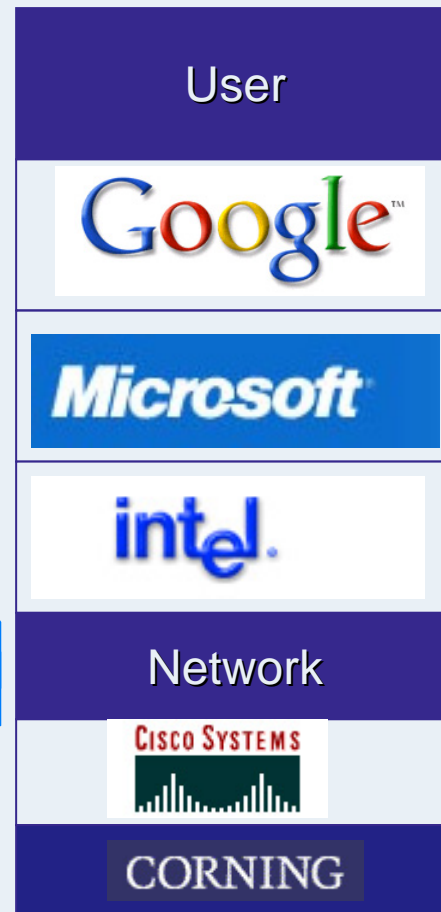- Adding value to packet pushing happens from end device to end device

"Convergence" vs Reality

- There is no next vertical "killer app"
- Overlays have already claimed the user!
  - Think XML, Ajax, RSS, Rendezvous, Torrents, Podcasts

Today's Carrier Squeeze Play

Nostalgia

User
Service
Application
Platform
Network
Infrastructure

Reality

User
Google
Microsoft
intel
Network
Cisco Systems
CORNING

Value transfer has already occurred

Value Redistribution in the Industry

INNOVATOR	EPS ($)	MKT CAP ($B)
MCIW	-11.22	6.5
SPRNT/NXTL	-0.31	34
VERIO/NTT	1.98	71.6
LEVEL3	-0.74	1.9
SBC/T	1.41	78
QWEST	-0.45	7.7
COGENT	-7.42	0.2
GLBC	-13.84	0.3
SAVVIS	-0.90	0.12
ABOVENET	n/a	n/a
WILTEL	n/a	n/a
TELEGLOBE	-0.74	0.2
C&W	0.70	4.7B
TWTELCOM	-1.12	1.0
(TWARNER)	0.48	82
XO	-2.18	0.4

INNOVATOR	EPS ($)	MKT CAP ($B)
CISCO	0.87	108
GOOGLE	3.41	97
AMAZON	1.25	19
YAHOO	1.07	49
EBAY	0.73	51
JUNIPER	0.53	13
APPLE	1.56	47.
INTEL	1.33	141
VERISIGN	0.93	6.15
DELL	1.27	76.3
MICROSOFT	1.12	269B

source: finance.yahoo.com, 25 oct 2005

Kim Claffey – CAIDA – ARIN XVI IPv4 Roundtable – 26 October 2005

Today's Operating Principles

- Stick to the basics - keep the overheads low and keep the network offering simple, stable, fast and cheap
- User value construction is happening over the top of the network through overlay structures
  - Open the network edge up for innovation
  - Stop playing pointless cat and mouse games with selective service interception!
- Really Useful Networking is a lowest common denominator utility packet carriage

What have we learned?

- Vertically integrated service providers are fading away into history - the deregulated competitive service industry continues to specialize rather than generalize at every level

  "Convergence" is now obsolete

End-to-End really IS important!

- Valued service delivery is changing – we are now seeing user value based on interactions across overlay systems that treat the network as a simple transmission service

- As it should be!

- The Converged Utopia of the old world carrier industry remains only as a piece of dull, unimaginative, monolithic mythology within this industry

- The Unconverged world of IP is diverse, vibrant, innovative, exciting and very much alive

And Maybe that's a Very Good Thing

Vive la difference!