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Viewgraph Sequence

No. 1	1291	Title - Active Networks in Telephony
No. 2	1315	Why Will Active Networks Succeed?
No. 3	1316	Why Active Networks in Telephony?
No. 4	1317	Layers of Active Networking
No. 5	1318	Active Network Services At the User Layer
No. 6	1319	Active Network Services At the Network Manager Layer
No. 7	1298	Active Network At the Network Owner Layer
No. 8	1300	Eliminating Standard Protocols with Active Networks

ACTIVE NETWORKS IN TELEPHONY

Nick Maxemchuk

WHY WILL ACTIVE NETWORKS SUCCEED ?

AT PRESENT ACTIVE NETWORKS ARE PRE-COMPETITIVE, **BUT**

1. **The IP Protocol is 25 Year Old**

   — It Pre-dates Inexpensive Processing

   — It Can't Fully Use ATM, Wavelength Routers
   or *ANY Future Communications Equipment*

2. **JAVA Is An Existence Proof**

   — Code Can Be Safely Down Loaded

   — *We Need a Network Sandbox*

3. **Greed:**

   — New Set of Products and Services

   — Opportunities for Start ups.

WHY THE TELEPHONE NETWORK ?

1) **Sell Processing In Addition To Bandwidth**

2) **Telco Terminals Are Dumber Than The Internet's**
   More Opportunity For Improvement By Processing

3) **Capsules Are Easier In The Telephone Network**
   Stateful System
   More Bits Per Message (Active Interval or Call)

4) **History of Multi-Party Collaboration**
   Conference Calls
   More Participants → More Opportunity for Assistance

5) **The Telephone Network Will Become An IP Network**
   When The Internet Becomes Active,
      So Must The Telephone Network
   When The Current TDM Architecture Was Selected,
      IP Was Pre-Competitive
   It Won't Take a Quarter Century For Competitive Active Networks

LAYERS OF ACTIVE NETWORKING

↓ - *Fewer Restrictions on Functions*
↓ - **Bigger Sandboxes**

1) User: Cannot Influence Other Users

2) Network Manager: Can Influence Group of Users Who Are Customers

3) Network Owner: Incorporate New Technology Rather Than Letting Network Become Obsolete Then Replacing It.

End Vertical Optimization
Extend the Internet Philosophy
Separate Xmission And Services

SERVICES AT THE USER LAYER

1. Voice Coders:

Negotiated Per Connection *(Packet Phone)*
Network No Longer Locked to 64 kbps

2. **Continuous Presence at an ISP:**

Detect an Idle Line to Break the Connection,
But Remember the Destination
Continuous Presence Without Tying up the Line

3. **Network Bypass:**

Select the Circuit or Packet Network
Based on QOS and Cost

4. **Protocol Conversion for Legacy Data Devices**

5. **Minimal Protocols**

Standards Have More Options Than Used In Any Session

SERVICES AT THE NETWORK MANAGER LAYER

1. **Customized VPN's**
   ie: Security - Implement Firewalls at the Switch
   Adjust the Network for Telecommuters, Branch Offices
   And Peak Hours

2. **Integrate The Telephone Network and The Internet**
   - Use Packet and Circuit Switching Where Each Is Best
   - Circuits Shared By a Group Rather Than Per User

   A. **Add Lines on Demand for an ISP**
   - Add Circuits in Hot Spots to Reduce Long Waits
   - Give to the First ISP For Free

   B. **Reclaim Part of the MBone From the Internet**
   - Multicast Video and Audio Are Better Implemented on Circuits or Reserved Bandwidth
   - Also Real Time Traffic

THE NETWORK OWNER LAYER

Objective: To Mix Routers, Switches And New Technologies

Premise: Network Elements Do Not Have To Be Compatible,
or Perform The Same Function,
As Long As The Result is Acceptable To The User

Operation: Network Elements Follow Instructions In Capsules,
Rather Than Communicating With Adjacent Elements

Capsules Contain:

- Instructions to Avoid Certain Network Elements,
- Different Instructions for Different Elements, and
- Instructions That Elements Implement Differently

The Evolution of the language is the same as IP
(IP over IP → encapsulated capsules)

NETWORKS ARE DISTINGUISHED BY DIFFERENT IMPLEMENTATIONS OF THE SAME SERVICE

ACTIVE NETWORKS CAN ELIMINATE STANDARD PROTOCOLS

Example: Capsules Are Not Fixed Lenght,

However, We Don't Need a Standard for When a Capsule Ends

Instead, The Program Tells how **THIS** Capsule Ends

Capsules Contain Protocols, *But*
They Can Be Different in Every Capsule

Standardize A Language Instead of Protocols
Like Standardizing Fortran or C, Instead of Programs

Venders Can Sell *Better* Proprietary Protocols
ie: The Protocol Can Provide Better Quality, Use Less Bandwidth, or Require Fewer Cycles In The Switches.

Eliminating The Need To Standardize Protocols And Providing A Means To Profit From Better Protocols Will Increase The Rate Of Change of Communications Networks