Requirements for SAM

draft-muramoto-irtf-sam-generic-require-00.txt

Eiichi MURAMOTO

Yuji *-UG-* IMAI

Nobuo KAWAGUCHI

WIDE Project
XCAST fan club ASIA/Japan

P2P/ALM/OM system already exists.

- Video & Audio
  - End System Multicast @CMU et, al.
  - Skype (~10 persons)
- File sharing
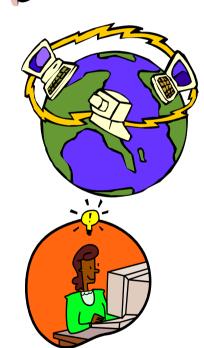 - Gnutella
  - Bittrerant
  - Winny

Why we start another efforts for this area?

A Brief History of the Internet
by Prof. Ammar's

Think Up A Networked Service

Establish/Upgrade **Connectivity** To Provide Service

Think Up A New/Improved Network Service

The Service-Connectivity Cycle

"Why Johnny Can't Multicast:
Lessons about the evolution of the Internet"
(Presentation at NOSSDAV Keynote, June 2003)

A Tale of Two Scalability Schemes

- **Replication/Caching**
  - Requires little infrastructure support
  - **Followed services-connectivity cycle**
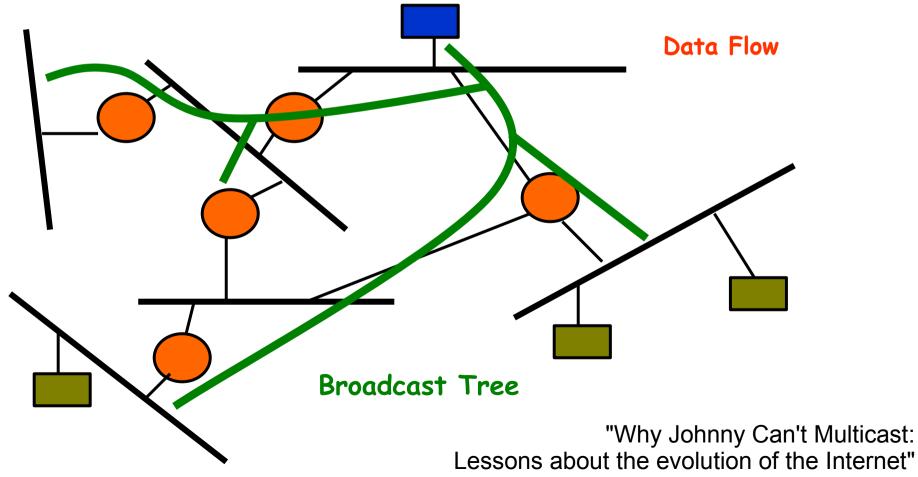 - In wide use today

- **Multicast**
  - Requires infrastructure support
  - **No chance to evolve – initial proposals were very ambitious**
  - No large-scale deployment today

"Why Johnny Can't Multicast:
Lessons about the evolution of the Internet"
(Presentation at NOSSDAV Keynote, June 2003)

What we experienced recently.

- We know/believe ALM, OM, XCAST can drive

  "**service-connectivity cycle**".

  – End user freely start distributions whenever they want.

  – They are satisfied once but will want **much more**.

- **Anarchic usage** of bandwidth applications is now about to broke the balance of the Internet eco-system.

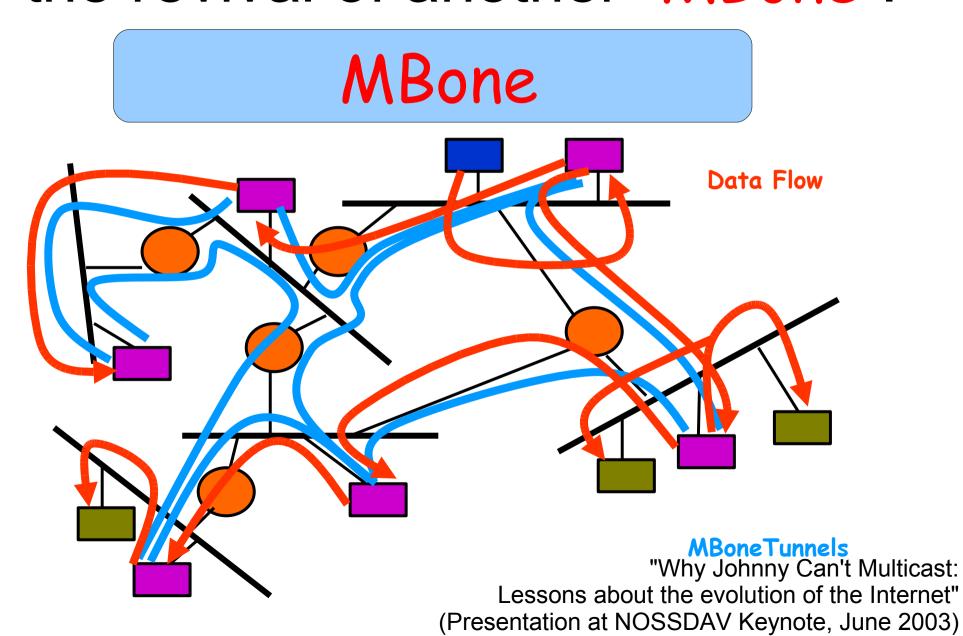 – As well as financial balance sheet of the tier-2, 3 ISPs.

Prof. Ammar warried about the revival of another "MBone".

Ideal Multicast Tree

Data Flow

Broadcast Tree

Prof. Ammar warried about the revival of another "MBone".

MBone

Data Flow

MBoneTunnels
"Why Johnny Can't Multicast:
Lessons about the evolution of the Internet"
(Presentation at NOSSDAV Keynote, June 2003)

The MBone Gives Multicast a Bad Reputation

- Unreliable
- Heavy Loss
- Low Bandwidth
- Unwieldy – Hard to manage
- Does not really save bandwdith!

What was changed from "Mbone" to current P2P Multicast?

- ~~Unreliable~~ ← Redundant transmission
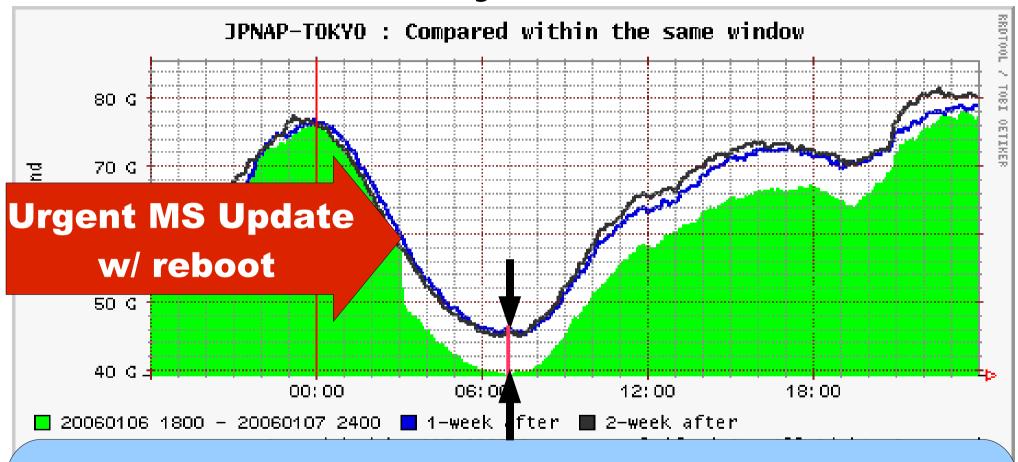- ~~Heavy Loss~~ ← Bandwidth Infration
- ~~Low Bandwidth~~
- Unwieldy – ~~Hard to manage~~ ← Self-organized
- Does not really save bandwdith!

**P2P Multicast overcome.
But situation becomes ugly.**

"Why Johnny Can't Multicast:
Lessons about the evolution of the Internet"
(Presentation at NOSSDAV Keynote, June 2003)

Reality check.

JPNAP-TOKYO : Compared within the same window

Urgent MS Update w/ reboot

20060106 1800 – 20060107 2400   1-week after   2-week after

Winny (Self-organized P2P file distribution system) constantly wastes **multi Gbit/sec** at least by redundant file duplication, someone guess.

Can we really recover "fairness" & "cooperativeness"?

- In the age of Von Jacobson, community was so tight that **everyone** change TCP stack "Slow-started". It was **beautiful** collaboration.

- Netscape TUNED their browser to accelerate the download speed using "socket pool".

- MS TUNED initial WSS value to 2 to win the window growth competition.

- Today, some P2P file distribution systems spent bandwidth for previous caching and anonymity.

What we are challenging.

- Keep "**service-connectivity cycle**" for ease-of-use and end-user scalability.

- Make application & experiences rich by SAM.
  - Better quality, Rapidness & Robustness.

- Simultaneously, keep the Internet eco-system.

  - Co-exist with neighbors' traffic.

  - Invite ISP for collaboration ring to enjoy multicast goodness and help accelerate it.

That's why we have to make our multicast **Scalable & Adaptive**.

Base requirements

1. Multicast capability

   – one-to-multi point

   – multi point-to-multi point

2. Service-connectivity cycle

   – Minimize starting-up cost of SAM, both at the end nodes and in networks.

Scalability requirements

3. Very large number of trees & groups in the Internet.

   – So that millions of humans and multiple-sensors can communicate.

Adaptivity requirements

4. Fast routing convergence

  – Catch up unicast routing path changes. When link or router failure.

5. Dynamic topology change

  – Mobile and MANET situation might be assumed.

6. Dynamics of group membership

  – it is necessary to assume frequent change of group membership.

Adaptivity requirements

7. Latency (Delay sensitivity)

- – The delivery path of the multipoint communication should be able to optimized to shorten the total transmission delay.

8. Dynamic topology change

- – Mobile and MANET situation might be assumed.

9. Congestion avoidance

- – To co-exists w/ other or oneself traffics.

10. Redundancy

- – In case of forwarding node failure or deserting.

Security requirements

11. Unexpected utilization of resources

   – Don't use the other's resource too much.

12. Authorization of group membership

   – Prevent malicious nodes from receiving the distributed packets.

13. Protect against DoS.

   – Prevent crackers from using SAM as embedded Botnet.

14. Encryption and key distribution

Considerations

- Comments & requirements from others. Thanx!
  - "efficiency of data distribution/transmission" by Jun Lei.
  - "Multicast should not artificially concentrate traffic on certain nodes or certain links." by Rick Boivie
  - "common understanding on the requirements" is useful by Xiaoming Fu.
- No "one size fits all" approach.
  - Depends on individual applications, requirements for SAM are different.
  - Building block approach should be considered as well as RMT and so on.

Remained works

- Revising by comment immediately after THIS meeting.

- "Problem space" & "Existing problems"
  – Ex. Input from Global Information Grid

- "Explanation why requirements is important."
  – with Jun Lei ? :-)

Any other?