

MDO6

Multiple Destination Option on IPv6

draft-imai-mdo6-01.txt

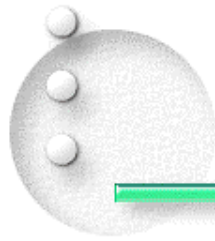
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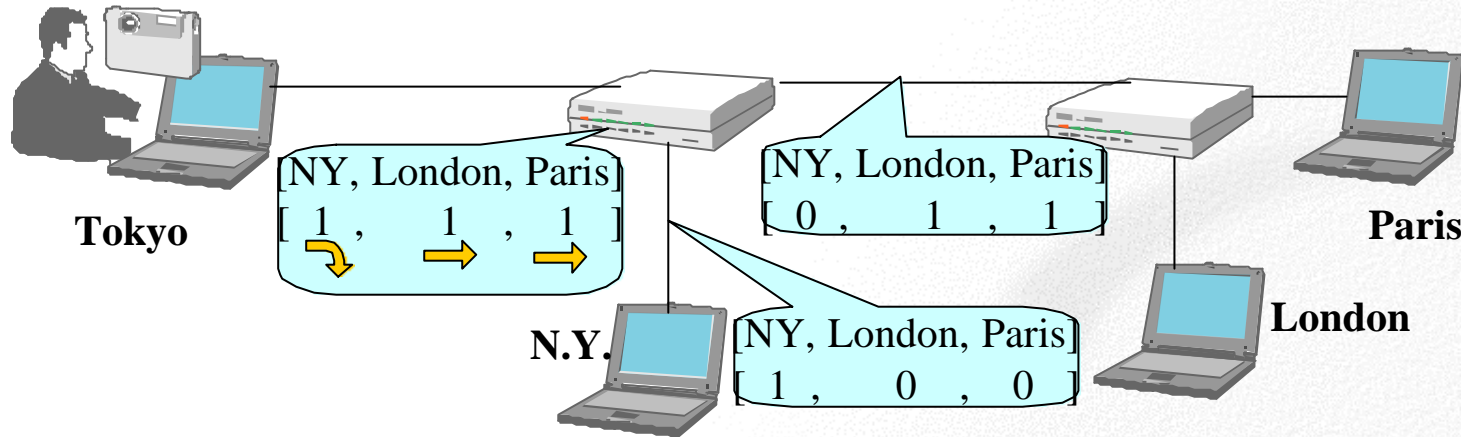
IPv6 based XCAST

| | | | | |
|--------------------------------------|-----------------------------------|--|-----------------------|---------------|
| IPv6 header SRC=Tokyo DST=N.Y. | Hop-byHop header TAIL=Paris | ROUTING header [N.Y., London, Paris] [1 , 1 , 0] | Destination header | UDP header |
|--------------------------------------|-----------------------------------|--|-----------------------|---------------|

- List of destinations is embedded in new IPv6 routing header.
- Hop-by-hop option is placed in order the routing header to be evaluated by all intermediate routers.
- Destination options are for security protection.

Bitmap

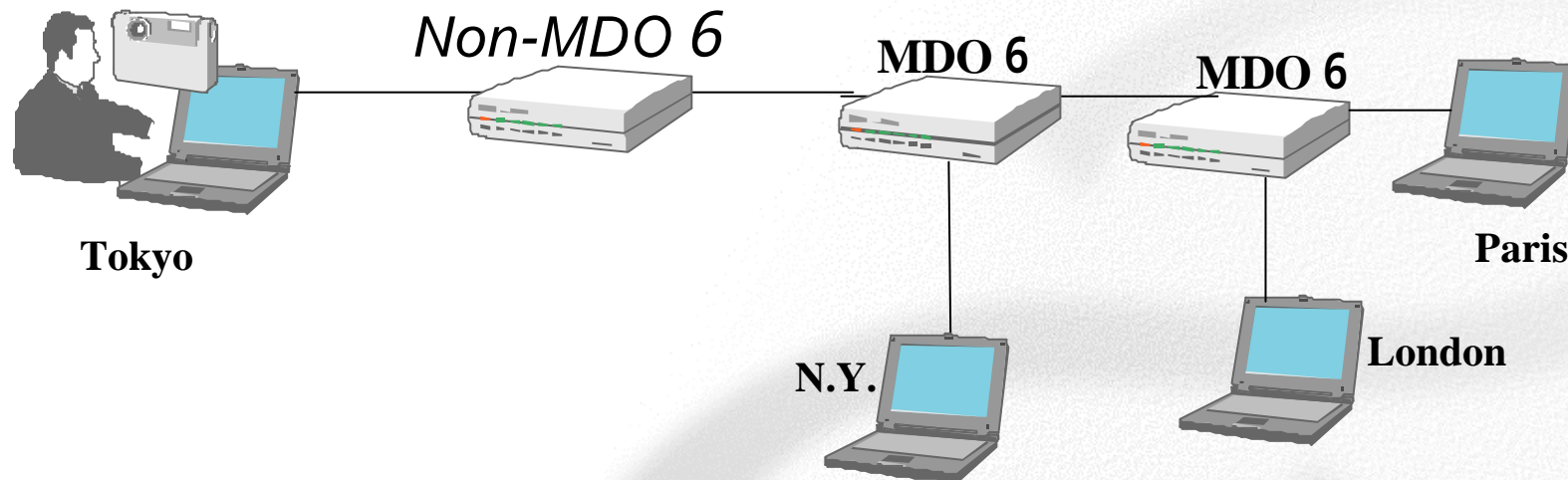
| | | | | |
|--------------------------------------|--------------------------------|---|--------------------|------------|
| IPv6 header SRC=Tokyo DST=N.Y. | Hop-byHop header TAIL=Paris | ROUTING header [N.Y., London, Paris] <i>[0 , 1 , 1]</i> | Destination header | UDP header |
|--------------------------------------|--------------------------------|---|--------------------|------------|



- Record of delivery status of the datagram.
- Intermediate routers need not to shrink header nor to re-caluculate the checksum

Gradual Deployment

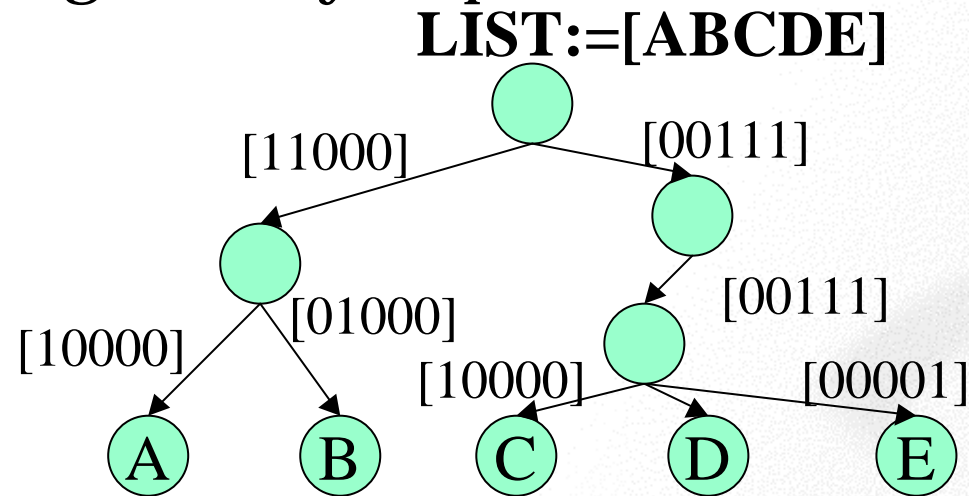
- The dest of IPv6 header is one of destination un-delivered.
- The type of MDO6 Hop-by-hop option has prefix “00” that specifies ignore and just forward the unknown type datagrams.



- The datagrams that is passed through the branching point will turn back at the next MDO6 router.

Tractable list

The destination list that retrieved the multicast spanning tree by depth first order.



All destination has same next hop if the head and the tail of un-delivered part of the list has same nexthop.

Only by 2 look-ups,

non-branching router can decide not to diverge.



Anti-smurfing protection

Smurfing: DoS attack by src address spoofing

- Cracker packs and sends the MDO datagrams as follow (SRC,DEST)
:= (target, [list of non-conform nodes of MDO])
- MDO routers copy and deliver it for non-conform nodes
- All nodes volley ICMP not in service for the target .
- ICMP datagrams rush to the target and it loses performance.



Anti-smurfing protection(Cont.)

MDO6 protects it using dummy destination option

- A legal MDO6 datagram has a dummy destination header that type value has a prefix “01” (Just discard datagram whenever error occurred or type is unknown)
- Even if it is received by non-MDO6 node, it just discard it.
- Intermediate routers must check the destination option whenever it diverge the datagram.



Running Code

MDO6-kit #1 (June 2000)

- patch for FreeBSD 2.2.8/KAME
- vic (Video Conference Tool)
- RAT (Robust Audio Tool)

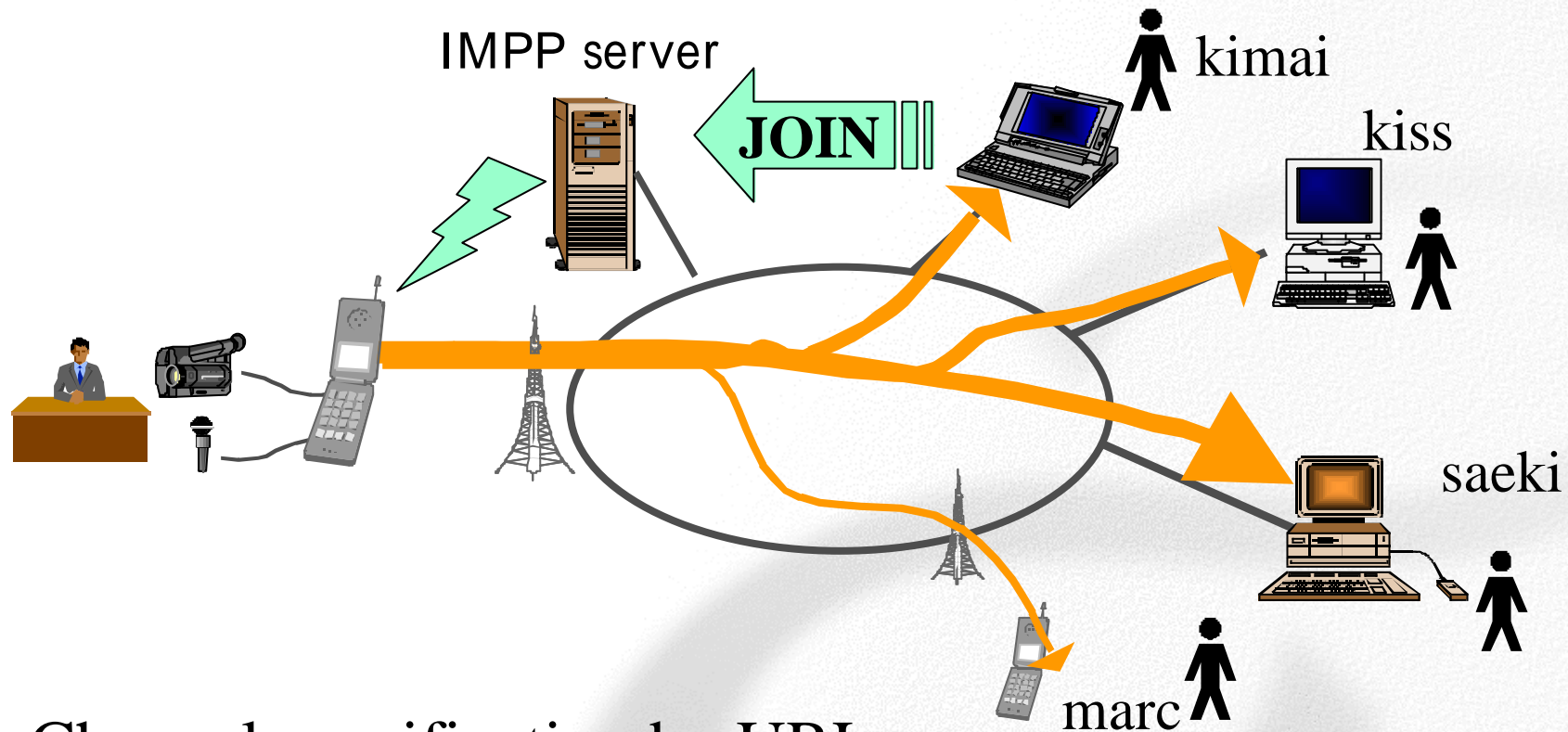
MDO6-kit #2 (soon available)

- patch for FreeBSD 2.2.8 & 3.4/KAME
- tcpdump
- vic & rat
- bzflag (multi-player 3D tank game)

<ftp://ftp.kame.net/pub/contrib/mdo6>

Group Membership by Presence Protocol

Real time membership management by
IMPP (Instant Message and Presence Protocol)



Channel specification by URL

```
% vic -n ip6 -S impp://impp.nifty.ne.jp/sgm_bof/video-chat
```

Small Group Communication

INET 2000 IPv6 showcase demonstration (18-21 July 00)

VIC
Video Conference

Bzflag: multi-player 3D tank game

RAT
Robust Audio Tool



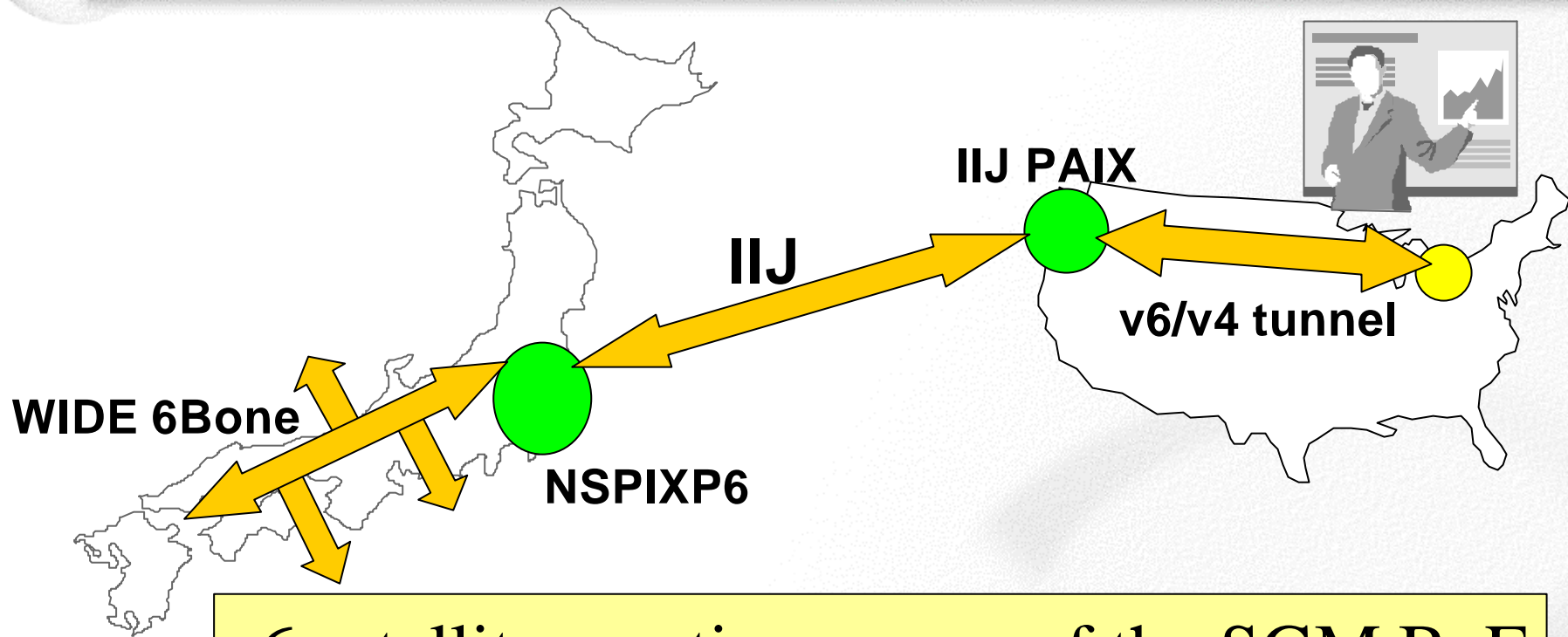
YOKOHAMA

NARA

KEIO

FUJITSU

XCAST video trial (中継2000)



- 6 satellite meeting rooms of the SGM BoF
KEIO Univ. NAIST, JAIST, FUJITSU, UEC, ISID
- bi-directional video & audio streams
- No rendezvous point
- No special multicast routing coordination



MDO6 characteristics

- IPv6 based XCAST
- bitmap to maintain delivery status
- gradual deployment
- tractable list for efficient forwarding
- anti-smurfing protection
- Running code & system
 - group membership by Presence Protocol
 - INET2000