The Past, Present and Future of TIPC Protocol

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WIND

Agenda

- TIPC Introduction
- TIPC Evolution History
- Demo

What is TIPC?

- TIPC = **T**ransparent **I**nter **P**rocess **C**ommunication
- A communication protocol designed for **clustered** computers

Cluster == Cloud

What is TIPC?

TIPC == Simple

- Service can run anywhere without changing its address
  - Service address is always valid
  - Service address is decoupled from physical location
  - Service address space can be limited
- Services can start to talk anytime whether its peer is launched or not

What is TIPC?

TIPC == Powerful

- Service can run as usual even if one of two interfaces it depends on is down
  - Redundant dual links
  - Link load sharing vs active/standby
- Service can be timely aware of any change of network topology or services if it wants
  - Service and topology tracking function
  - No more heat-beating

What is TIPC?

TIPC == Reliable

- Reliable datagram unicast and **multicast**
  - No real flow control, message may be still rejected
  - Rejected message may be dropped or returned
  - Multicast cannot be made returnable
- Connections with stream or message transport
  - Traffic control algorithm

Where is TIPC?

Main TIPC website: http://tipc.sourceforge.net/

- Linux
  - TIPC 1.6.x in Linux kernel as of 2.6.16
  - TIPC available as add-on for 2.6.16-2.6.34
  - TIPC 2.0 available as add-on for 2.6.35+
- VxWorks
  - TIPC 1.7.5 in VxWorks 6.7 (earlier versions from VxWorks 6.1)
  - TIPC 1.7.7 available as add-on for all 6.x

When is TIPC released?

- 1990’s
  - Single cluster proprietary versions created at Ericsson
- 2000
  - TIPC 1.3/1.4: Initial Open Source Linux version
- 2004
  - Wind River TIPC 1.0: TIPC subset ported to VxWorks
- 2006
  - TIPC 1.5/1.6 integrated into Linux & VxWorks
- 2007
  - TIPC 1.7: multi-cluster capability

When is TIPC released(Cont.)?

- 2012
  - TIPC 2.x: Linux kernel

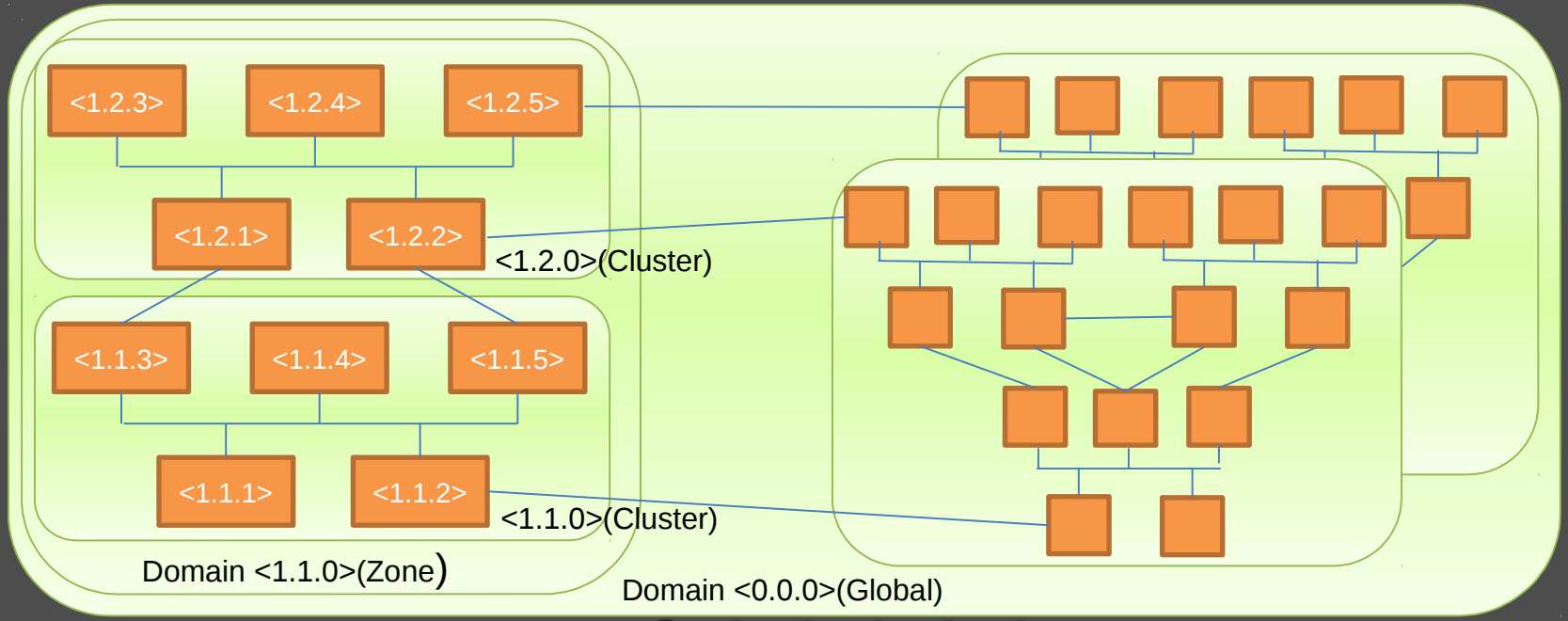
Who is doing TIPC?

- Developer
  - Jon Maloy at Ericsson
  - Ying Xue at Wind River
  - Erik Hugne at Ericsson
  - Richard Alpe at Ericsson

- Users
  - Telecom equipment manufactures
  - HA (High Available), such as OpenSAF

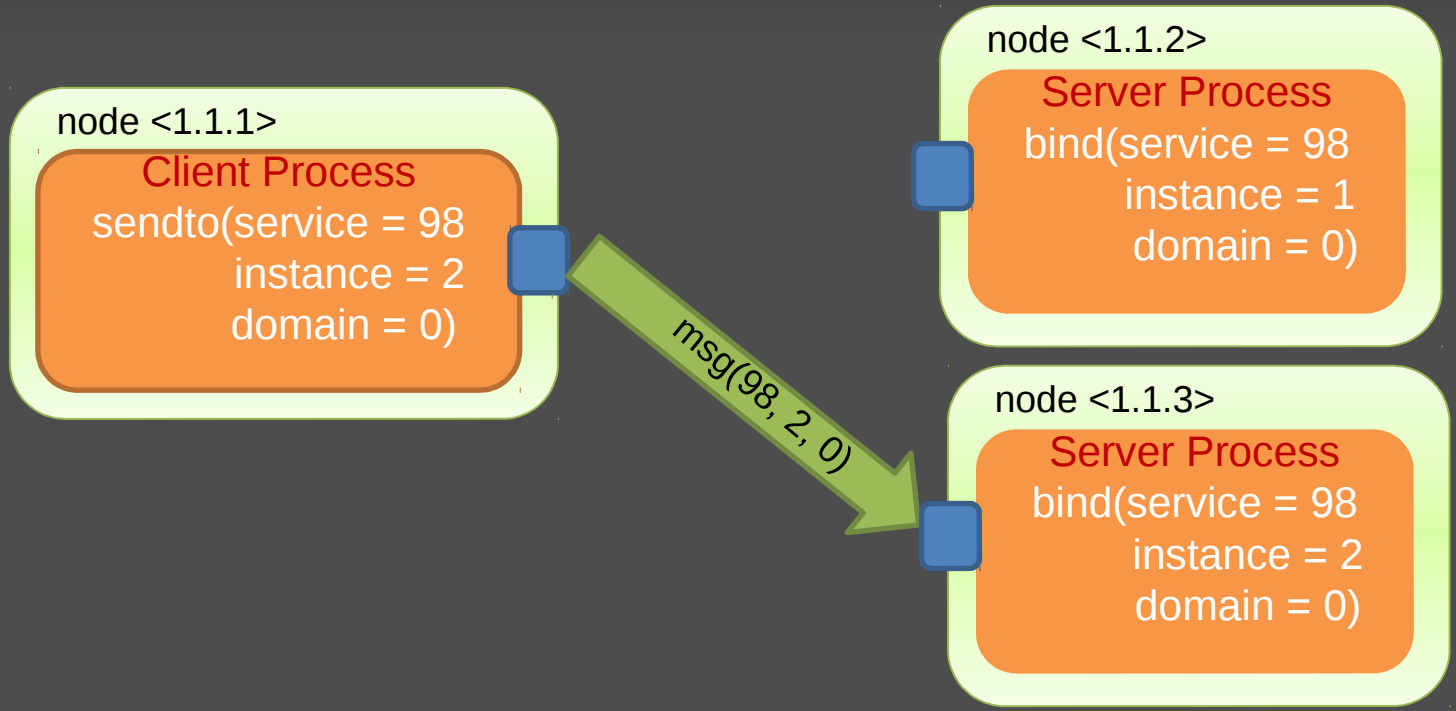
TIPC Network Topology

- 32bit domain identifier can be assigned to node, cluster and zone with <Z.C.N> structure

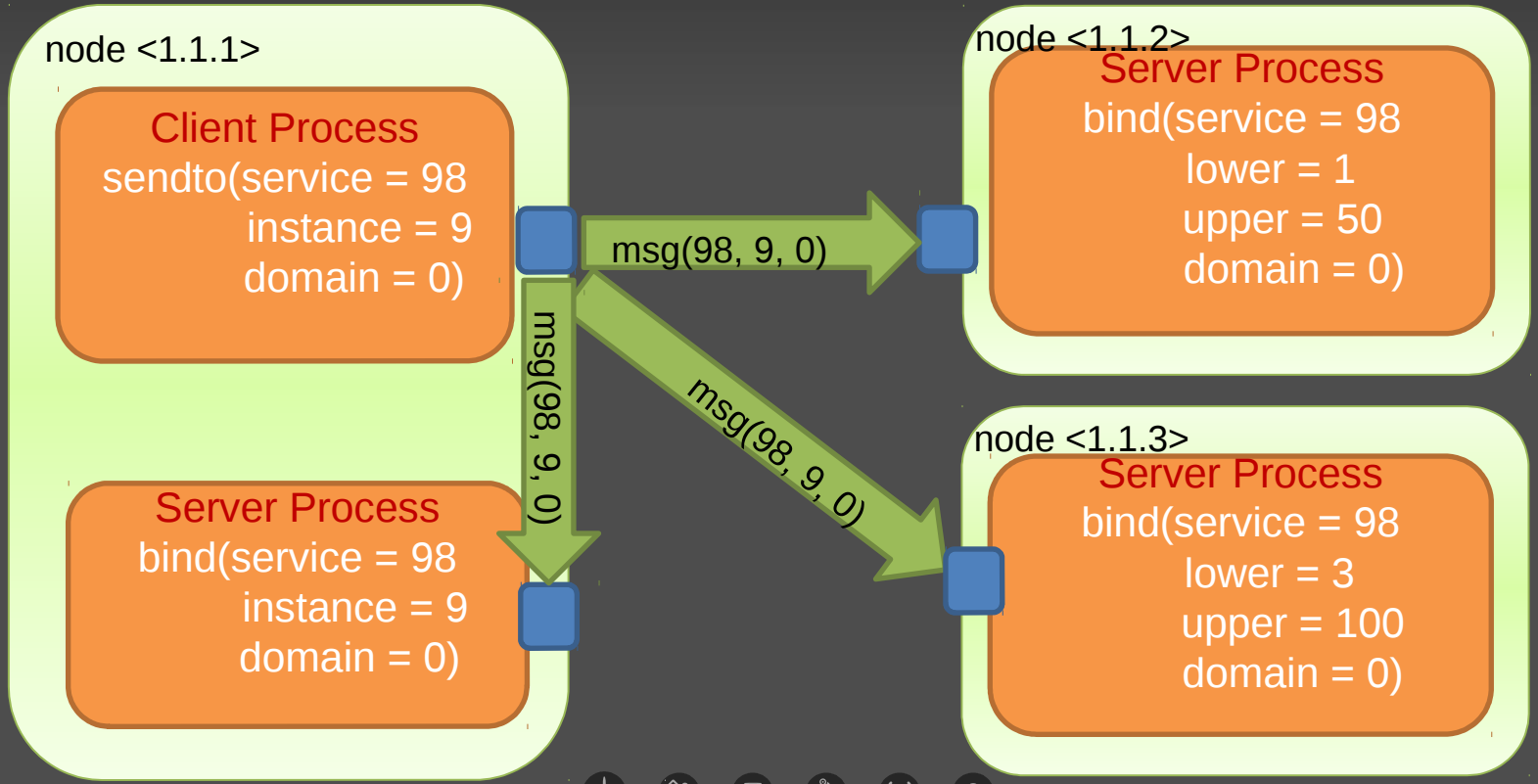


Location Transparency

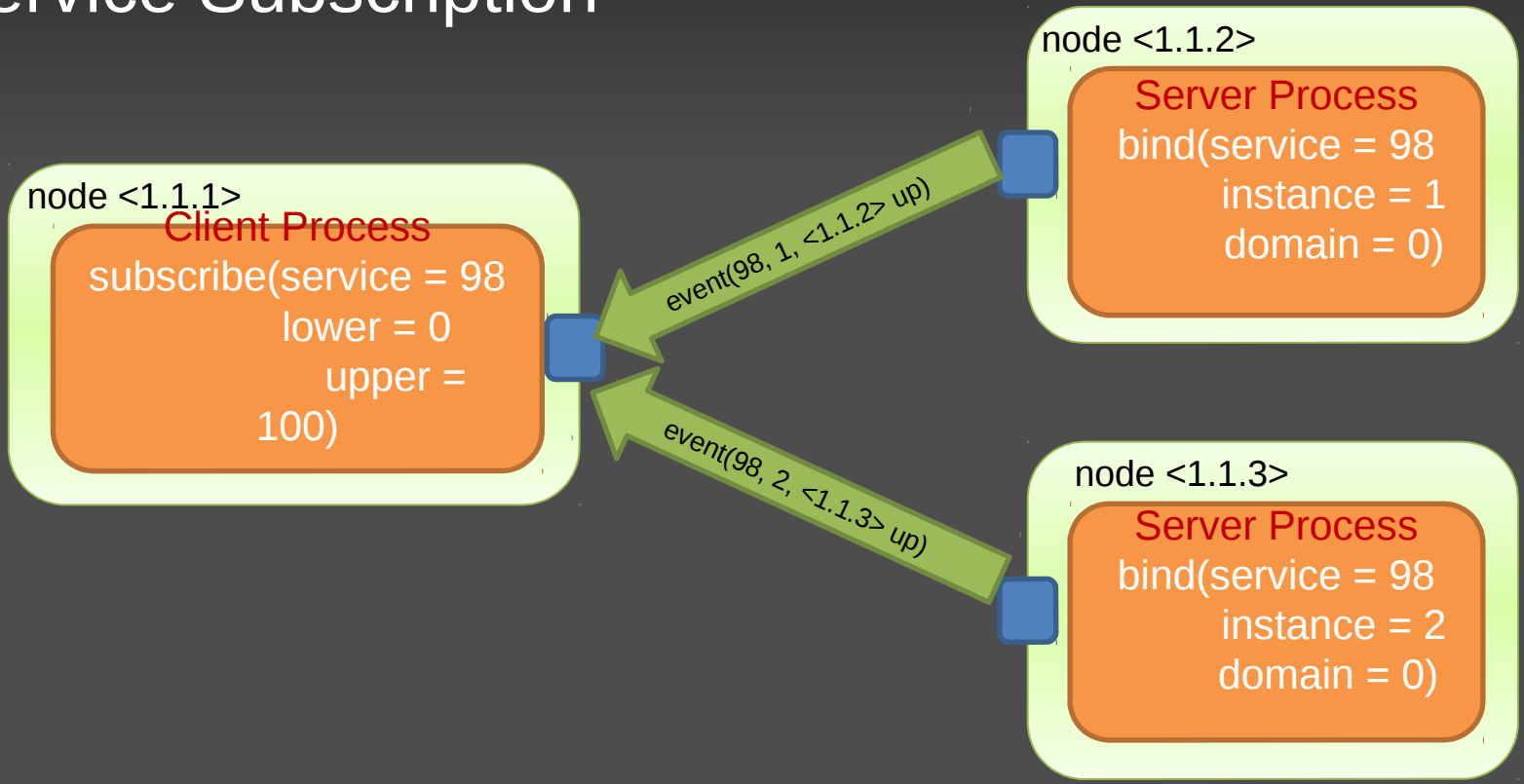
- Physical location of server is not known by client



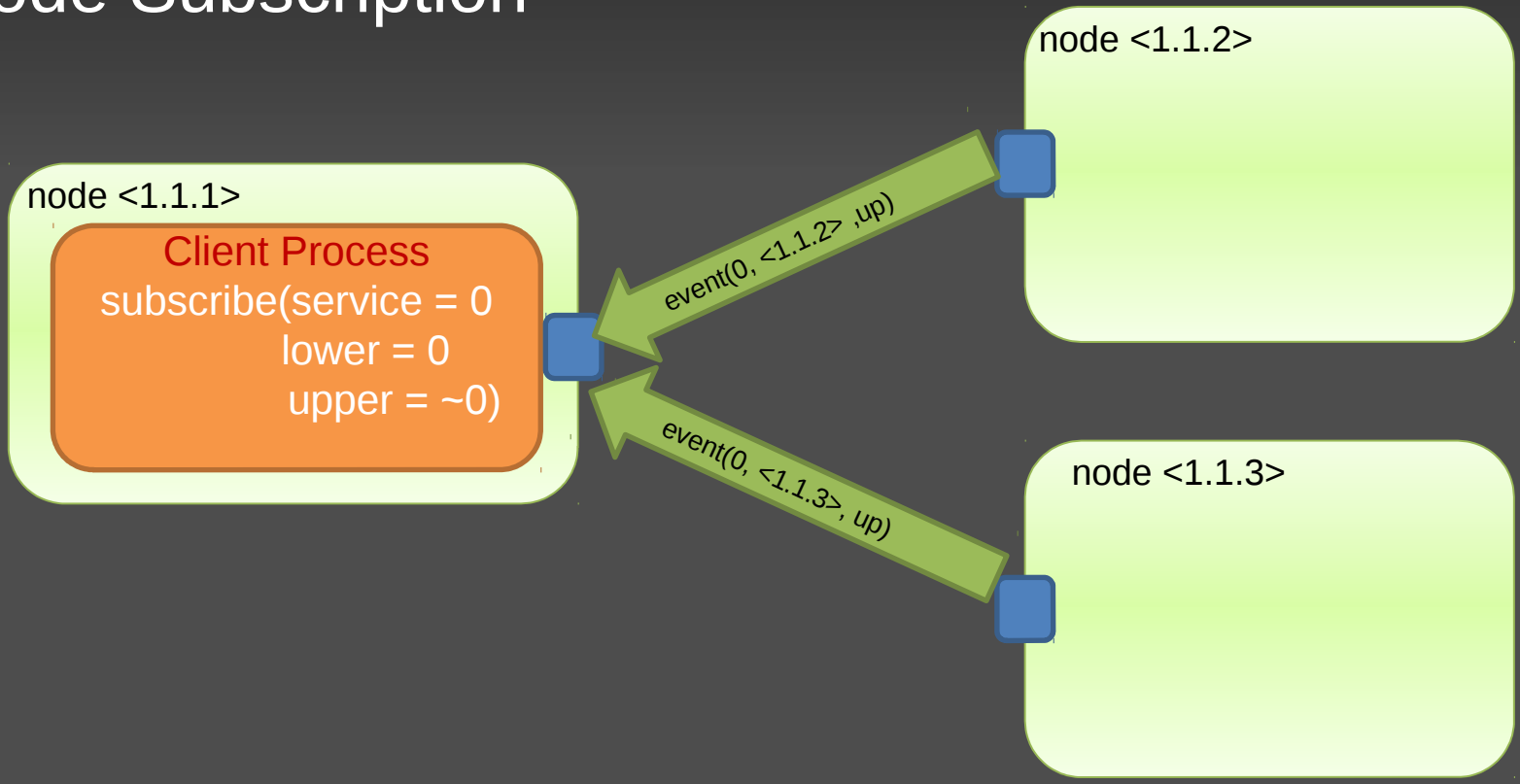
Reliable Multicast



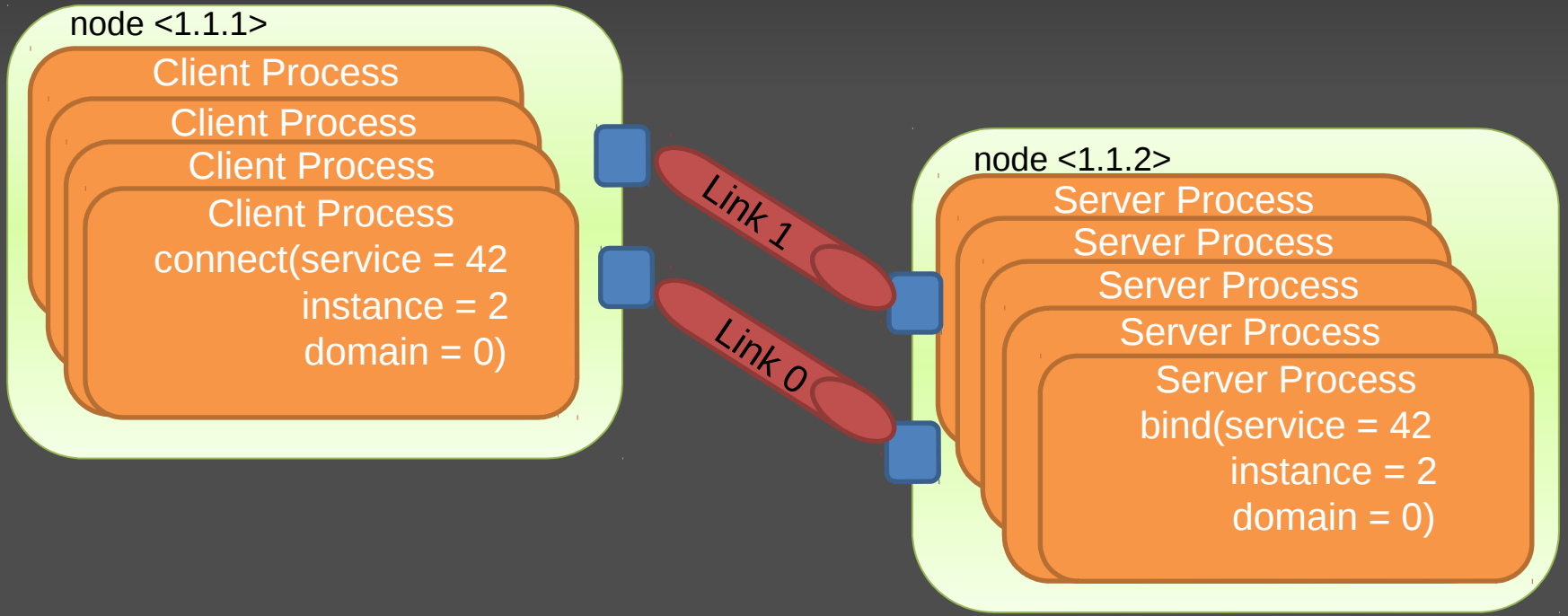
Service Subscription



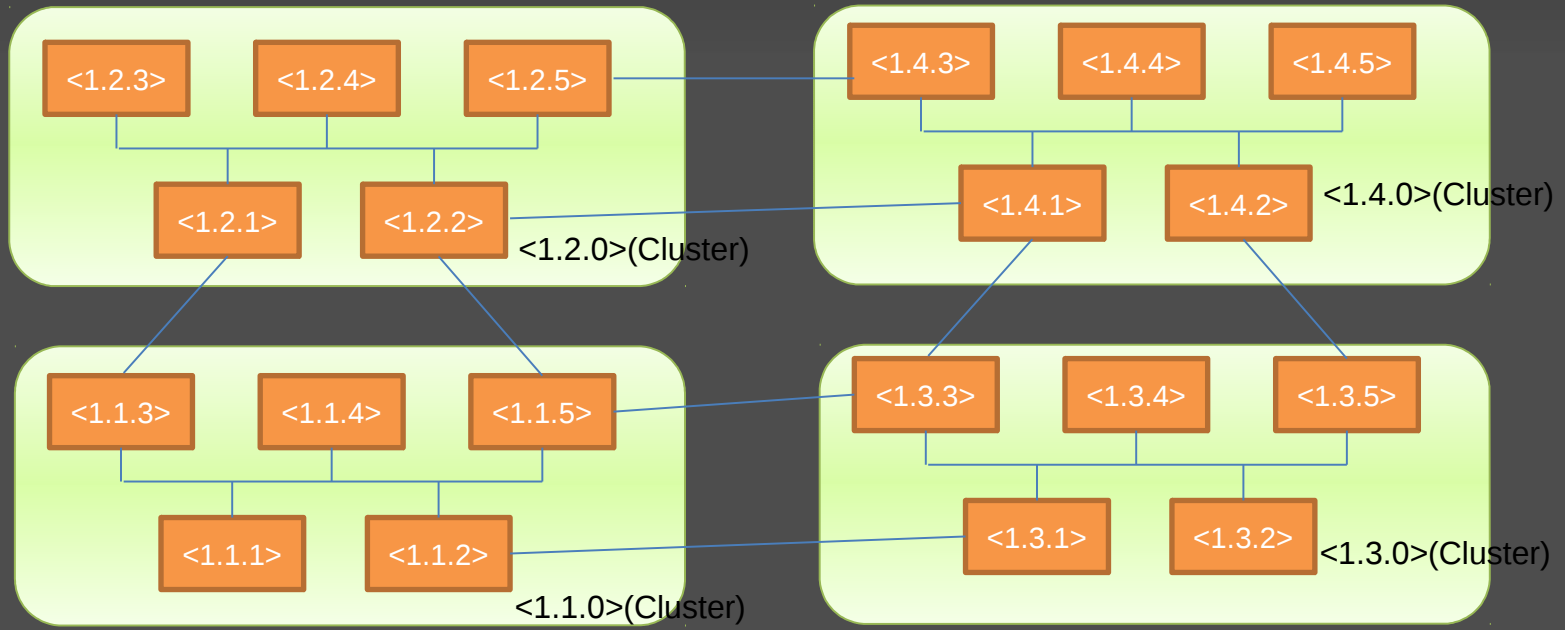
Node Subscription



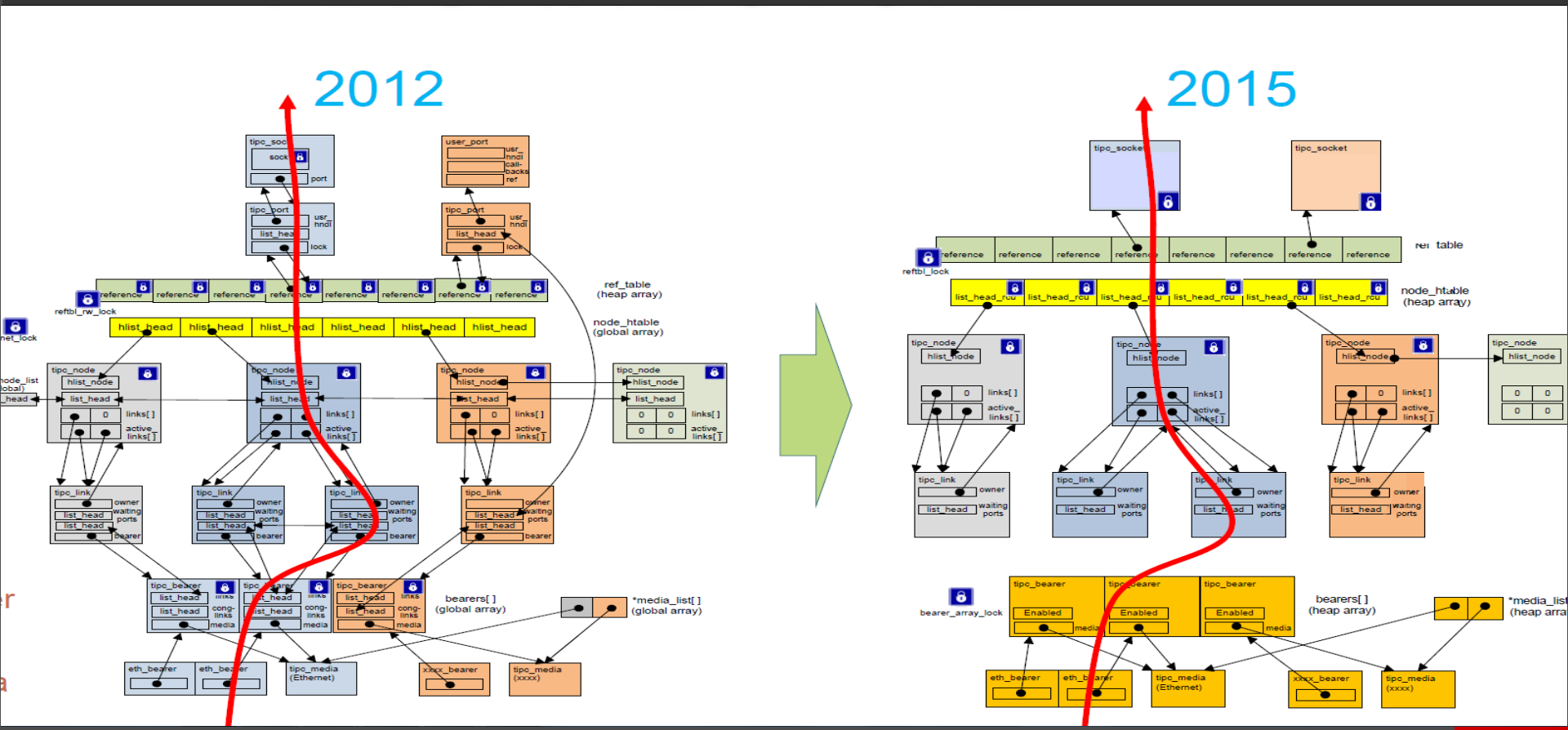
Redundant Dual Links



Neighbor Discovery



What Changed?



What Changed?

- Locking Policy
  - Rewrote internal server
  - Decoupled the close relationship between tipc_node and tipc_link structures
  - Introduced reference count for tipc_node structure
  - Replaced RW lock with RCU to protect node list
  - Replaced RW lock with RCU to protect name table
  - Introduced RCU lock to manage bearer list
  - Used RTNL lock to manage the process of configuring both bearer and link
  - Eliminated net_lock

What Changed(Cont.)?

- Locking Policy
  - Port structure was purged
  - Introduced rhashtable to manage socket references

- New Important Functionalities
  - Name space was supported
  - Introduced UDP bearer
  - Migrated TIPC configuration tool from tipc_config to ip through netlink

What will be Changed?

- Traffic Control
  - Improve link flow control algorithm, such as adaptable window size and congestion avoidance
  - Datagram and multicast congestion feedback
  - Improve multicast flow control algorithm
- Stability
  - Support full network space
  - Further reduce the area protected by node
  - Further improve network throughout

What will be Changed(Cont.)?

- Optimization
  - Overhaul of broadcast link
  - Introduce new mechanism to take precautions against the overload of socket receive buffer
  - Align code style with Linux

Demo

Questions?

- Ask questions through tipc-discussion mail list:
  - tipc-discussion@lists.sourceforge.net
  - http://sourceforge.net/p/tipc/mailman/tipc-discussion/