

# Intradomain Overlays



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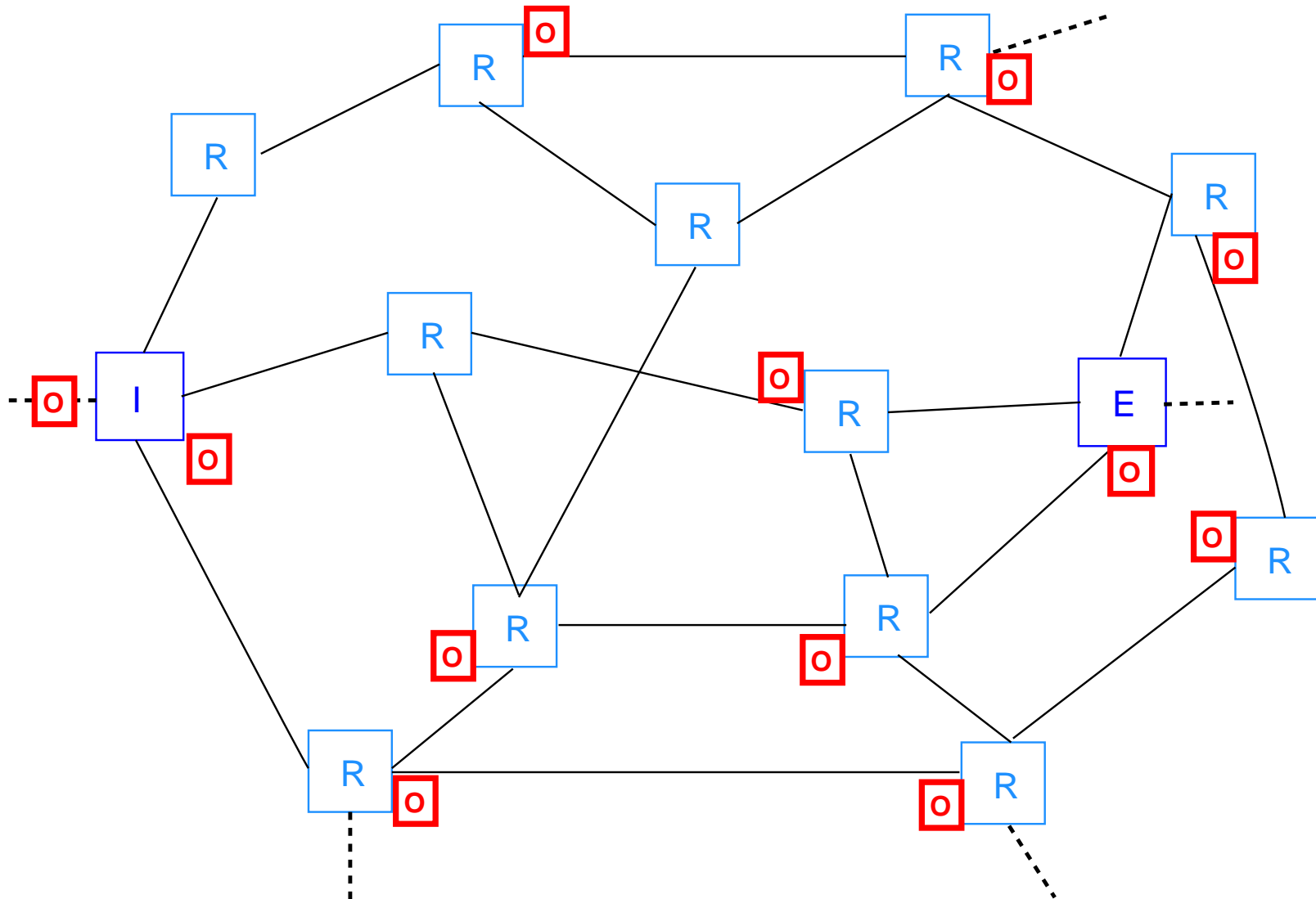
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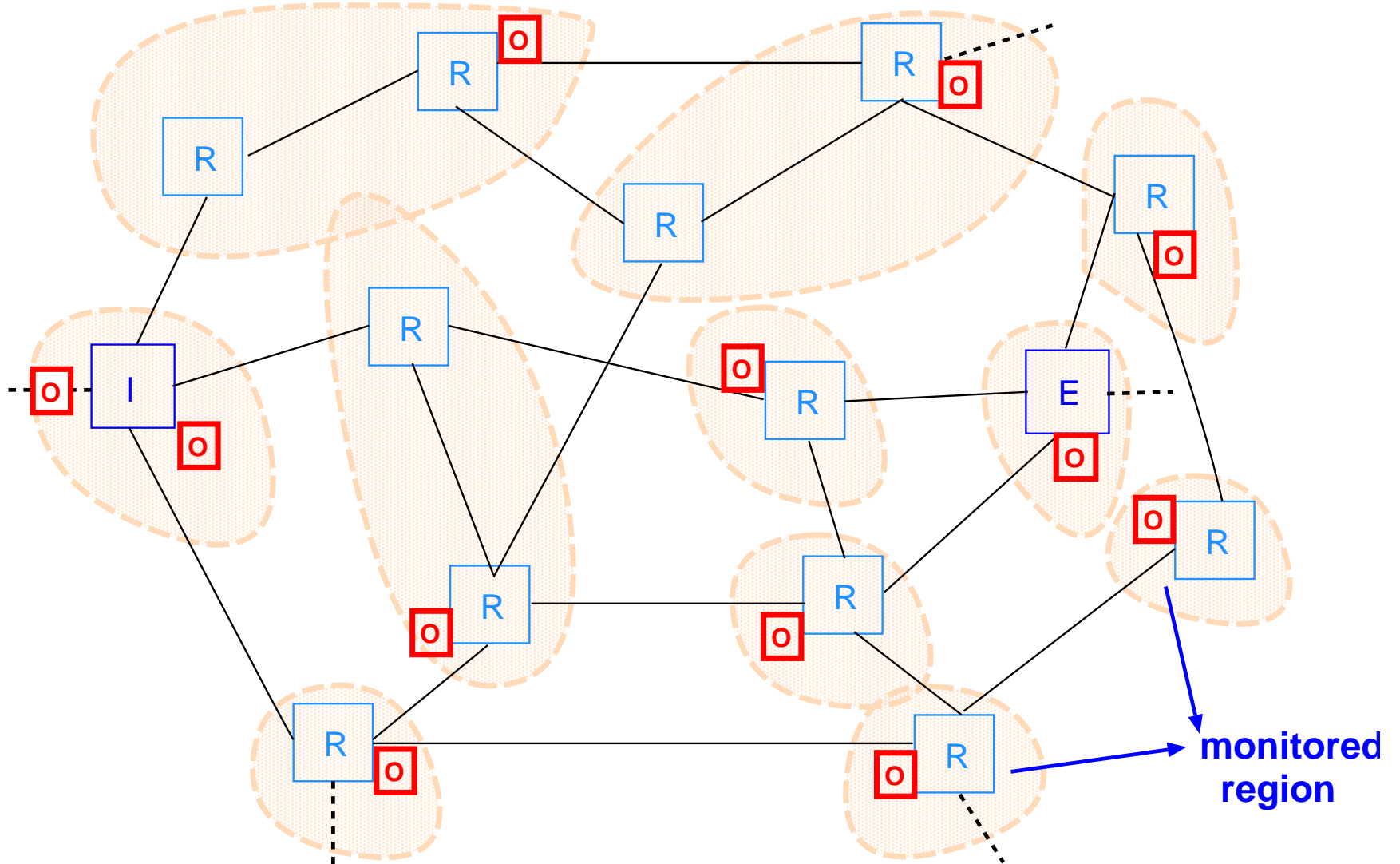
## Intradomain Overlays (Application-layer Unicast)

- Main idea: maintain a **overlay network**



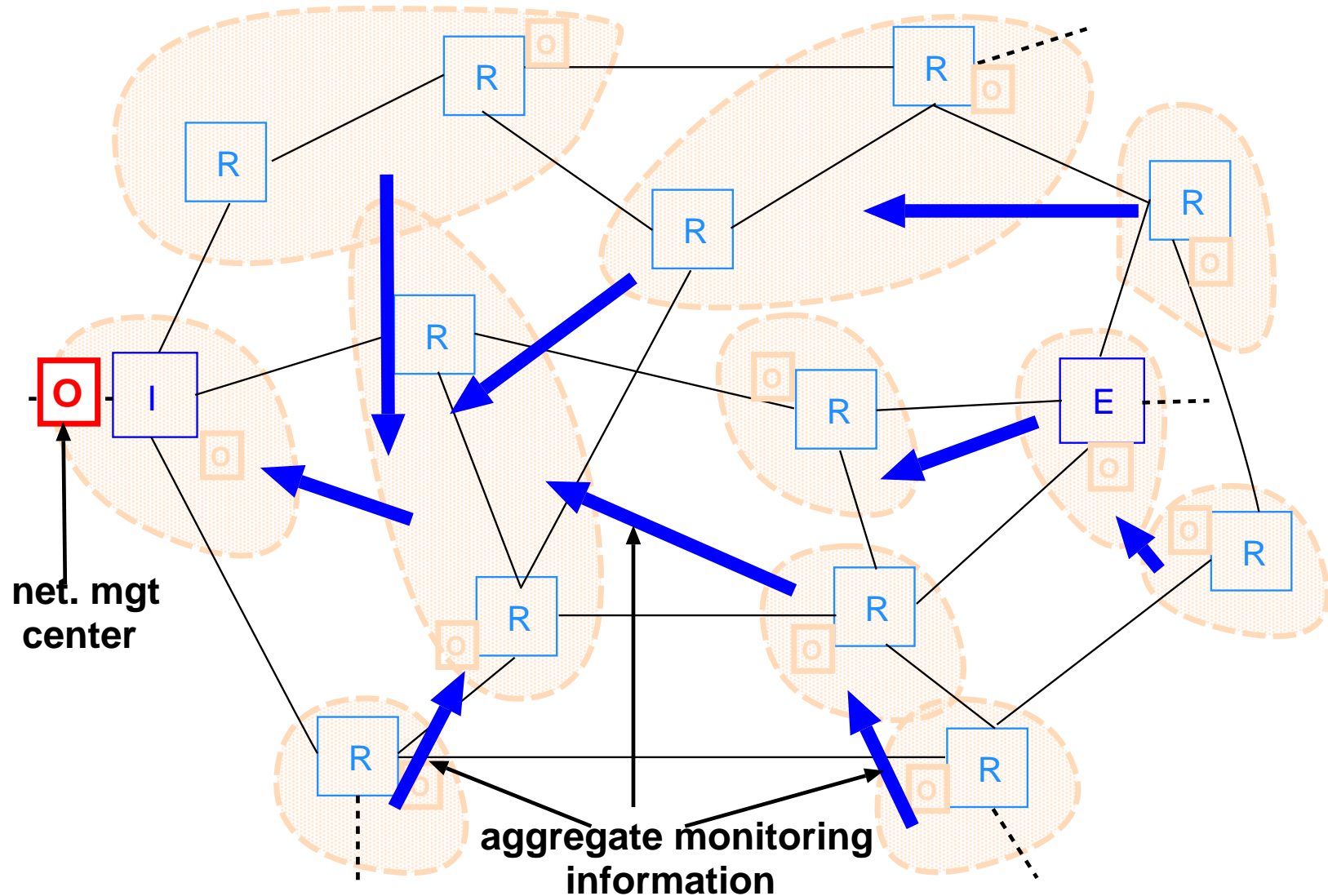
## Intradomain Overlays (Application-layer Unicast)

- Application: Overlays can monitor routers/net. traffic ...



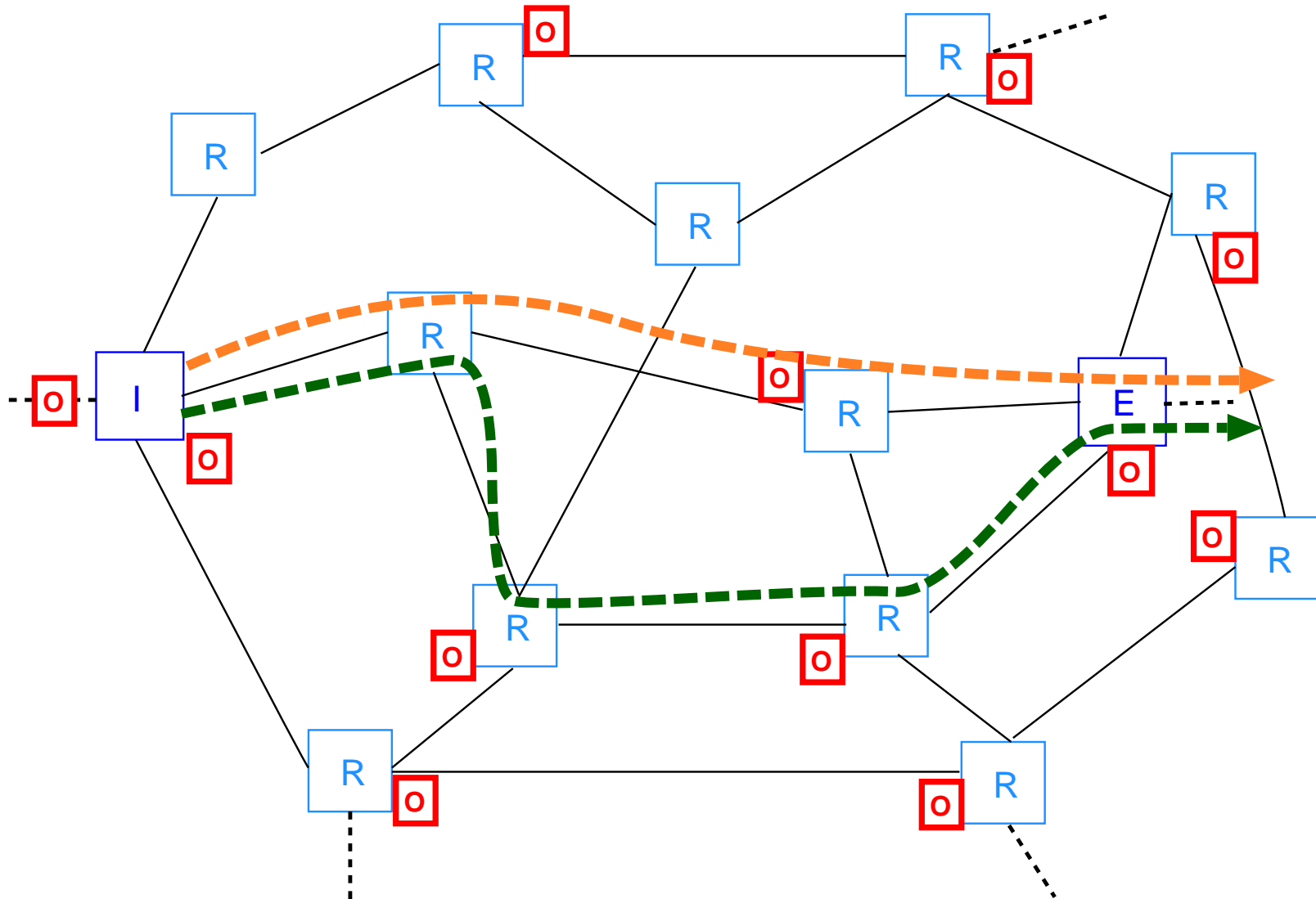
## Intradomain Overlays (Application-layer Unicast)

- ... and efficiently report information back to selected node(s)



## Intradomain Overlays (Application-layer Unicast)

- Monitoring info. useful for policy routing, intrusion detection, ...



## How can re-routing be used within a domain?

- “Automatic” load balancing (as new resources are added)
- Flash congestion relief
- Provide QoS for premium flows, say VoIP

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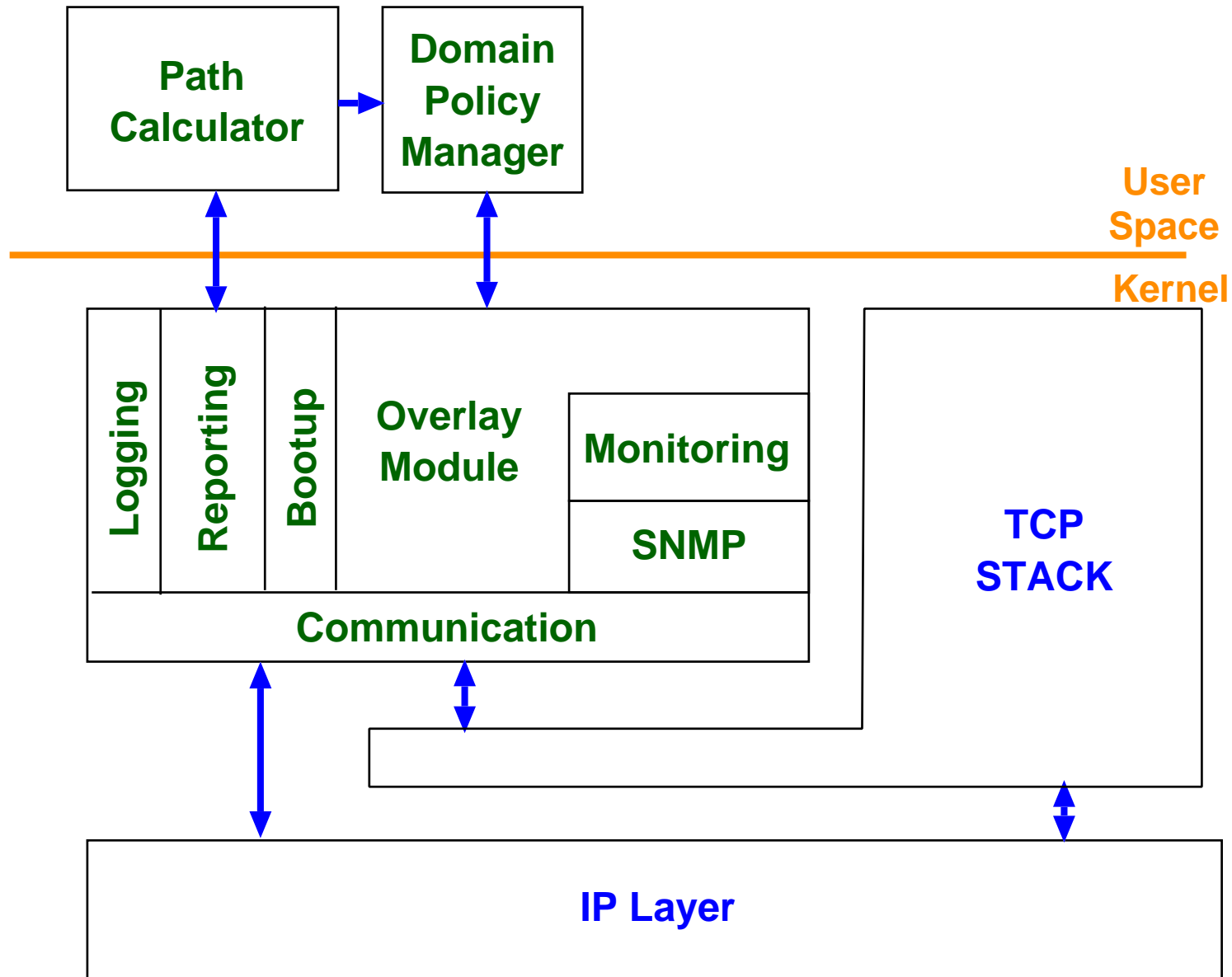
All incrementally deployable, globally transparent, and without changing underlying IP infrastructure

## Monitoring Protocol

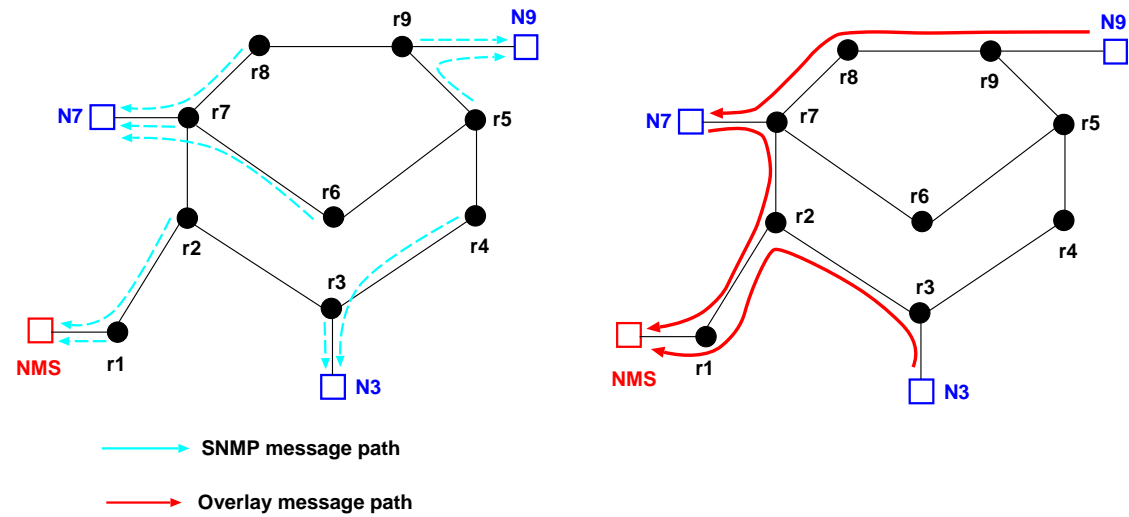
- Assumes central monitoring data repository (NMS)  
can be replicated
- Overlay nodes  
assigned routers to monitor (using base SNMP)  
form a spanning tree to report monitoring data back to NMS
- Overlay (and NMS) failures detected  
routers reassigned  
tree re-formed
- Publish-subscribe protocol between NMS and overlay nodes



## Overlay node software architecture



## NMS-overlay node protocol overview

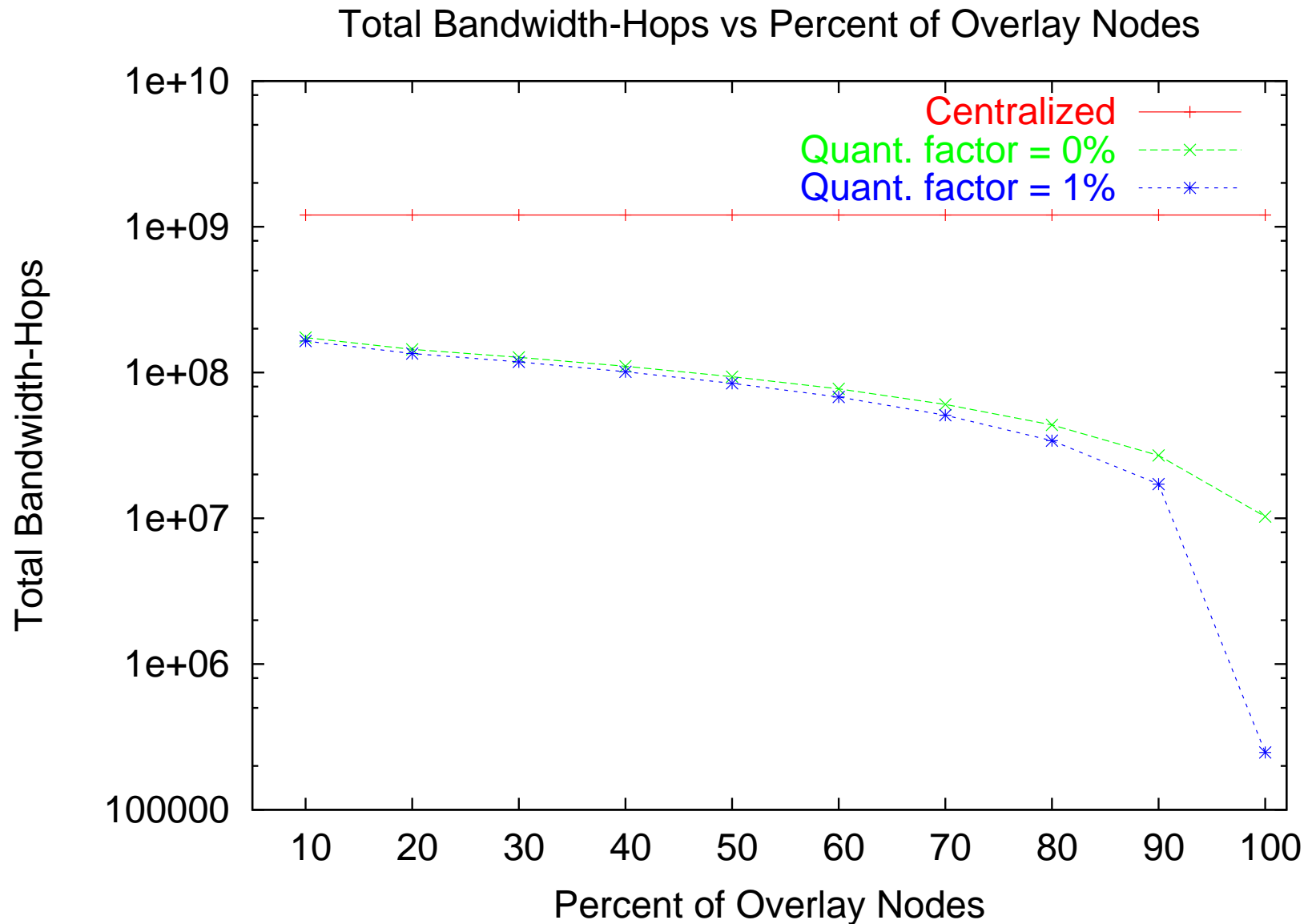


- Subscription
- Polling
- Response
- Publish

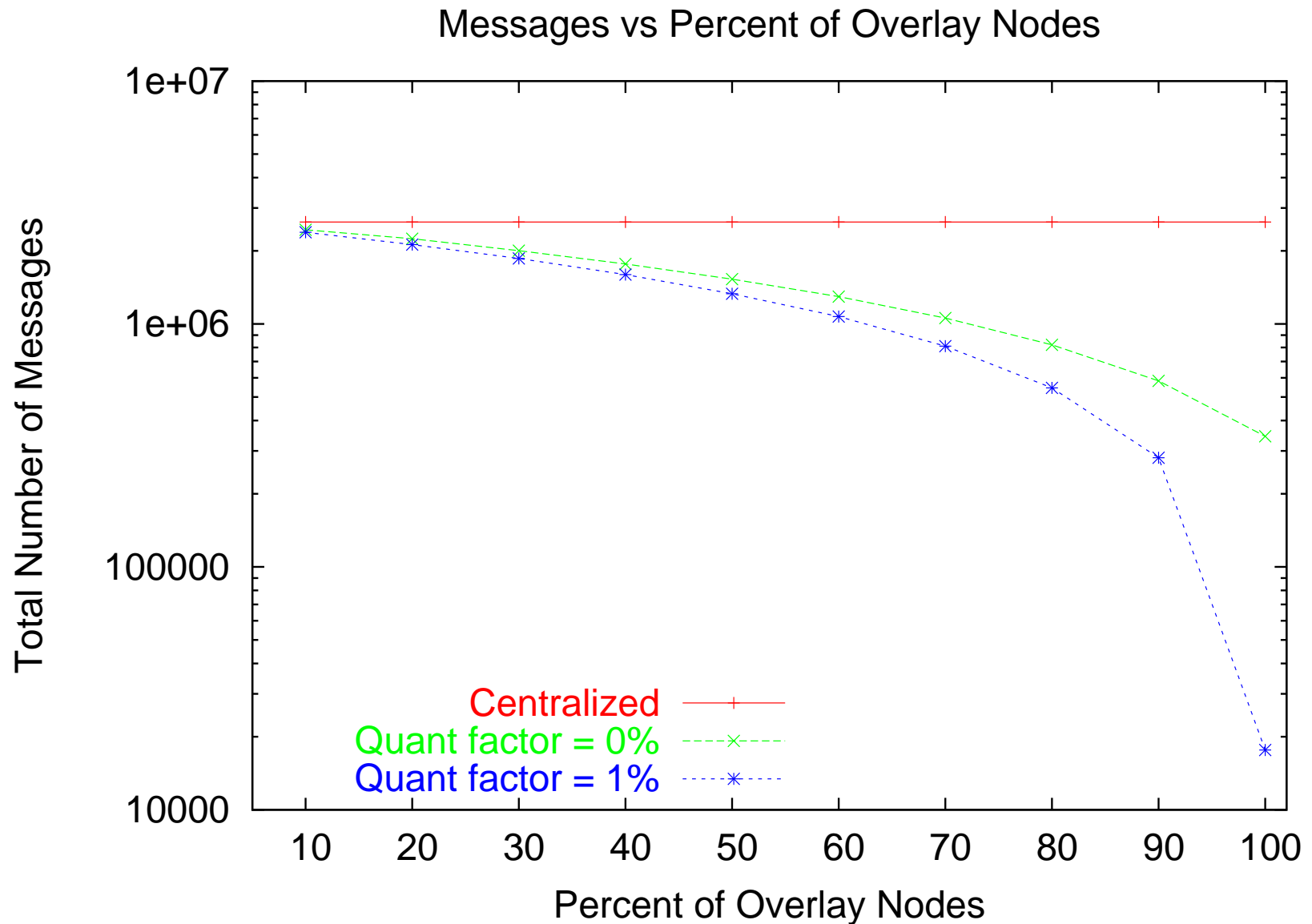
## Experimental Results

- Input data for overlay monitoring simulations from OIT network (438 routers, 29 backbone routers)
- Data for 7 days; 1–5 minute granularity
- For backbone routers and ethernet switches connect to backbone routers:
  - Octets, no. of packets, discarded packets, errors
- For BDF/IDF switches:
  - Octets, errors

# Overlay monitoring benefits: total bandwidth



## Overlay monitoring benefits: no. of messages



## Current work

- More experiments with UMD network
  - finer-grained monitoring of 400+ routers to use as input to our simulations
- Deployment of overlay nodes on OIT network
  - Current impl. on GNU/Linux (kernel version 2.4.x)
- Plans for high-speed overlay node implementation using intel ixp28xx network processors
- Manuscript in preparation for INFOCOM 2004