OLSRv2 - the 'what' and 'how', but mostly the 'why'

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Agenda

- OLSR Rundown - the basics of RFC3626
- Experiences & Experiments
- New Era OLSR: OLSRv2 development & standardization

OLSR Rundown
the basics of RFC3626

- Simple proactive link-state protocol:
  - periodic local signaling - link/neighbor discovery
  - periodic global signaling - link state diffusion
- Extensible & flexible specification
  - (or so we thought)
- Support for multiple interfaces:
  - multiple MANET interfaces
  - hybrid MANET/non-MANET interfaces

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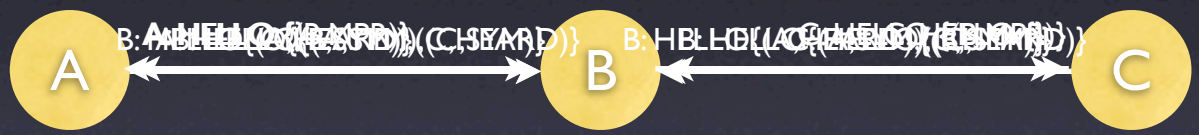
OLSR Rundown

Local Signaling

Neighbor	Status
B	SYM
C	2-HOP

Neighbor	Status
A	SYM
C	MPR

Neighbor	Status
B	SYM
A	2-HOP



1. Neighbor sensing
2. MPR Selection
3. MPR Signaling

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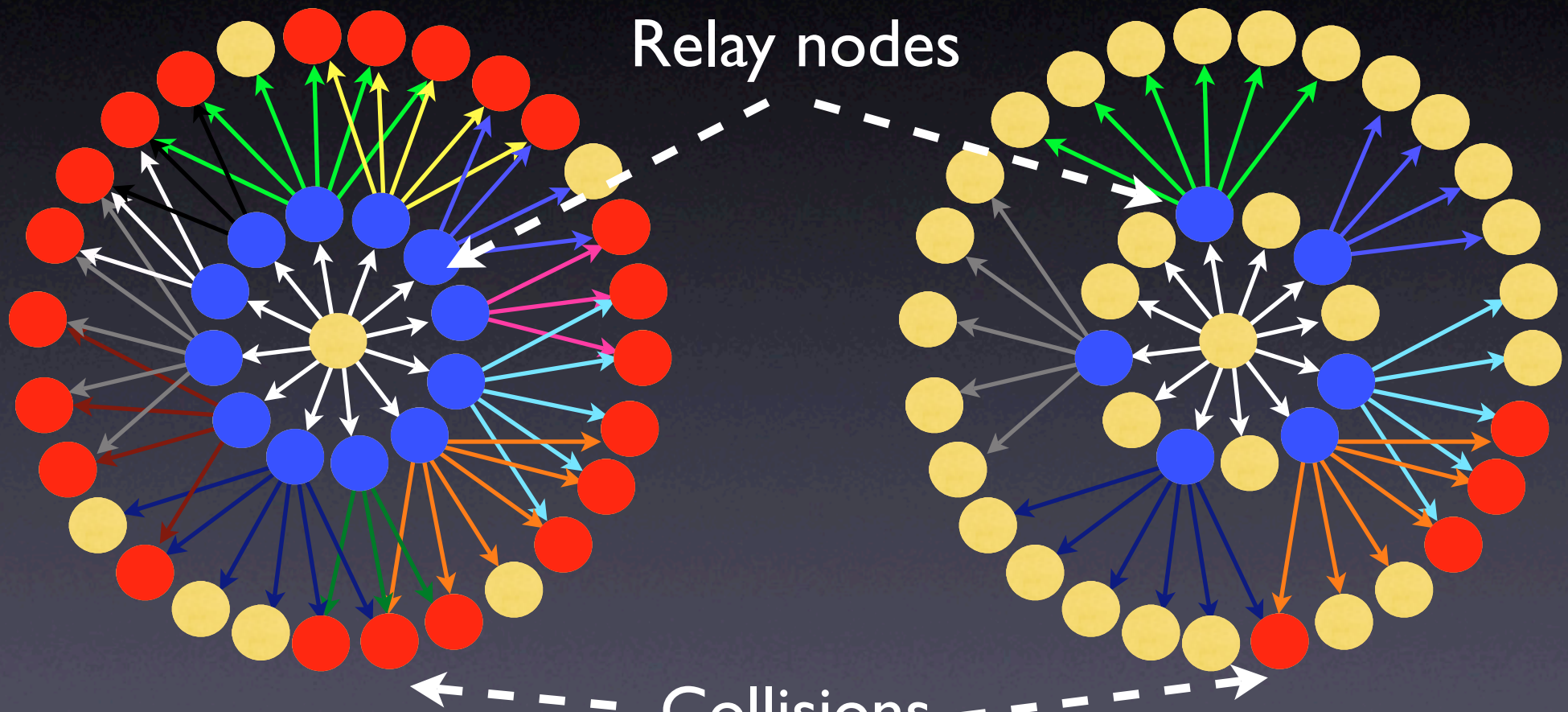
OLSR - MPR Flooding



Classic Flooding

MPR Flooding

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OLSR - Link State Diffusion

Neighbor Set

Neighbor	Status
B	MPR
C	2-HOP

Neighbor	Status
A	MPR-S
C	MPR-S

Neighbor	Status
B	MPR
A	2-HOP

Topology Set

Destination	Last Hop
C	~~B~~

Destination	Last Hop
A	~~B~~

Neighbor Set + Topology Set + Dijkstra = Routing Table

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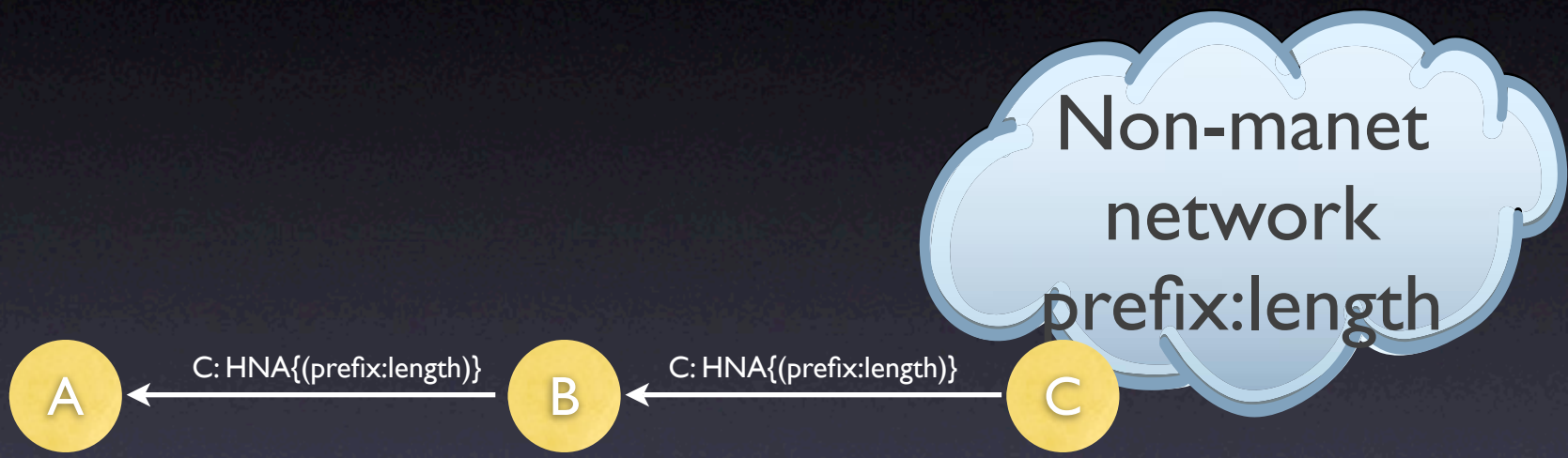
OLSR - Hybrid Net's



Topology Set

Destination	Last Hop
C	B
prefix:length	C

Destination	Last Hop
prefix:length	C

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Experiences & Experiments

- How did we do?
  - Last count: 51 known OLSR implementations
  - Annual OLSR interops/workshops (San Diego '04, Paris '05)
  - Small and large networks 3-70 nodes
- Great number of extensions:
  - multicast, QoS, security, ...

.....but.....

- Extensible & flexible specification
  - (or so we thought)
- Multiple Interface support
  - complicated - about 3-4 emails/week "how to do this?"
  - addresses in hybrid networks: "just different"
- Long specification (!)
  - different messages, same "semantics", different formats...
- Inefficient IPv6 support

New Era OLSR
The Road towards v2

- In a nutshell:
  - "OLSR with all the nits picked"
    - more flexibility, simplicity, efficiency, modularity
    - same well-known algorithms
- The Road Ahead:
  - IETF std. track RFC
  - I-D's ready and being refined, hopefully progress late '06 or early '07

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OLSRv2 Modules

- In the beginning, there was OLSRv2:
  - useful stand-alone components:
    - OLSRv2 Packet Format - TLV based, address compression
    - OLSRv2 Neighborhood Discovery - local link & neighborhood sensing
    - OLSRv2 routing protocol specification
  - Separately specified:
    - implementable, useable in isolation

OLSRv2 Packet Format

With Address Compression

- General Format (simplified):
  - `<packet-header><packet-tlv>*`
    `{<message-header> <message-tlv>*`
    `{<address-block> <tlv1><tlv2><tlv3><tlv4><tlv5>}}*`
  - packet header/tlv: link-verification, security,...
  - message header: anonymous forwarding
  - address block/tlv: properties of address pairs
    - "I have a link to this node, and the quality-metric associated is...."
    - head:middle:prefix compression
  - Substantial gains:
    - protocol-agnostic implementation - one-parser, one generator
    - implementable in short time & relatively few lines of code "weekend project"
    - flexible: internal & external extensibility

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OLSRv2 Neighborhood Discovery

- Tasks:
  - detect adjacencies, 2-hop topology
  - signal relay selection
- Tools:
  - periodic HELLO messages - OLSR/RFC3626, except:
    - using OLSRv2 Packet Format
    - timing information in TLVs (validity, interval)

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OLSRv2 Routing Specification

- Trivial:
  - uses packet format & neighborhood discovery specs
- Non-trivial:
  - simplified multiple interface handling: no MID, HNA
  - one message type: TC
    - advertise Link State, for both MANET and hybrid
      - allows expiration of hybrid parts

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How did we do (v2)?

- OLSR/RFC3626:
  - 4 message types, external, but no internal, extensibility
  - explicit enumeration of complete addresses
  - MANET and hybrid nodes: different expiration mechanisms

How did we do (v2)?

- New Era OLSR:
  - only 2 message types, external & internal, extensibility
    - single-parser for all messages
  - address compression, implicit IPv6 support
  - link-state is link-state: hybrid nodes == MANET nodes

How did we do (v2)?

- Additionally:
  - Packet Format, Neighborhood Discovery:
    - literally had a student implement over a weekend
    - useful in isolation, e.g. if all that's needed is efficient broadcast

Of Interest & Shameless Plugs

- OLSRv2 Development Community:
  - http://olsrv2.online.fr/blog
- OLSRv2 Interop/Workshop:
  - 2006: in Japan, late summer/early fall.
  - announcement on http://olsrv2.online.fr/blog
- Hipercom @Ecole Polytechnique
  - http://www.lix.polytechnique.fr/hipercom
    - slides from today, latest versions of specifications discussed, implementations, ...