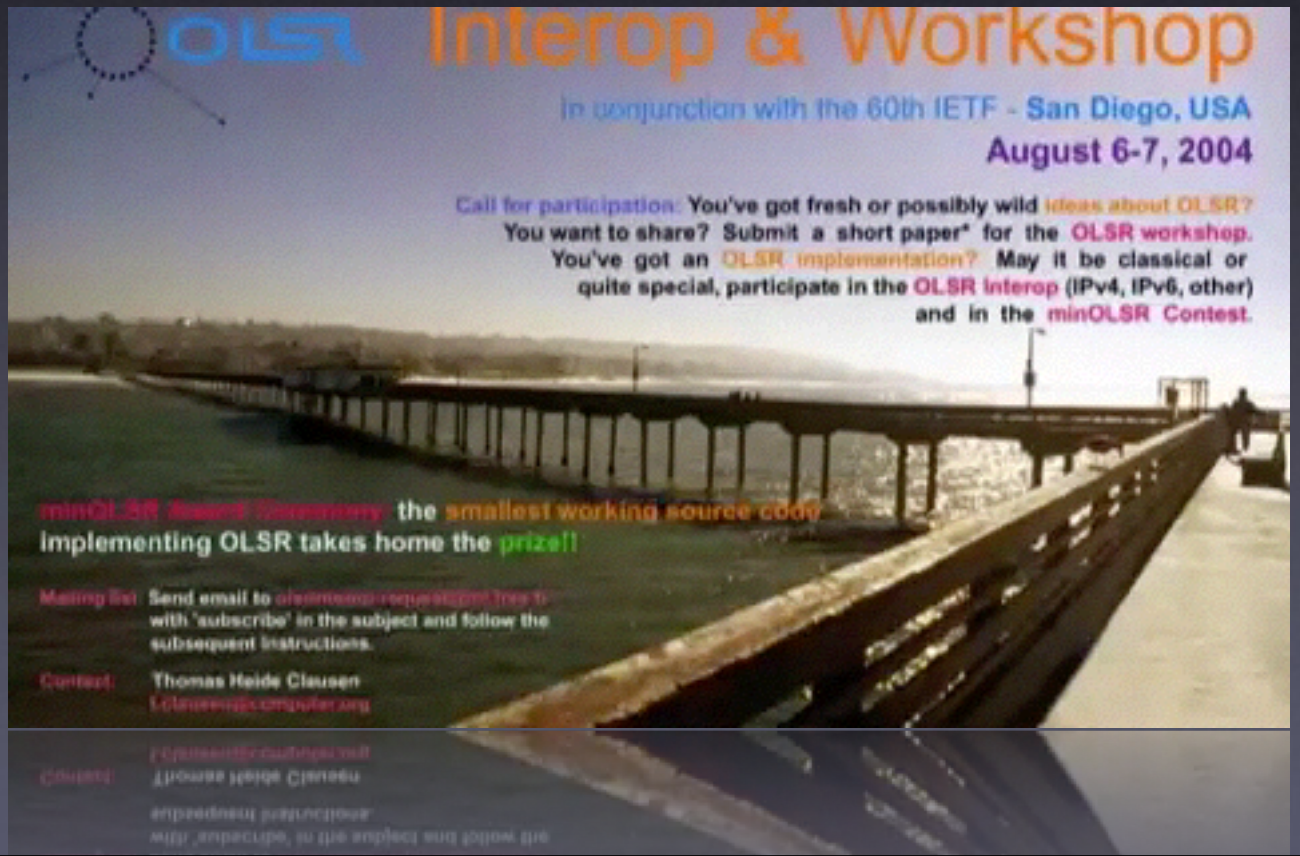
OLSRv2: 2004-2014

- Protocol Core + MIBs: 10 specifications
  Published: `RFC5148, RFC5444, RFC5497, RFC5498, RFC6130, RFC6779`
  RFC Ed. Queue: `draft-ietf-manet-rfc6622-bis, draft-ietf-manet-olsrv2`
  `draft-ietf-manet-nhdp-olsrv2-sec,`
  `draft-ietf-manet-olsrv2-mib`

HUGE thanks to all involved over the 10 years:
Workshops, Interops, Extreme Editing, Design Bashing, …



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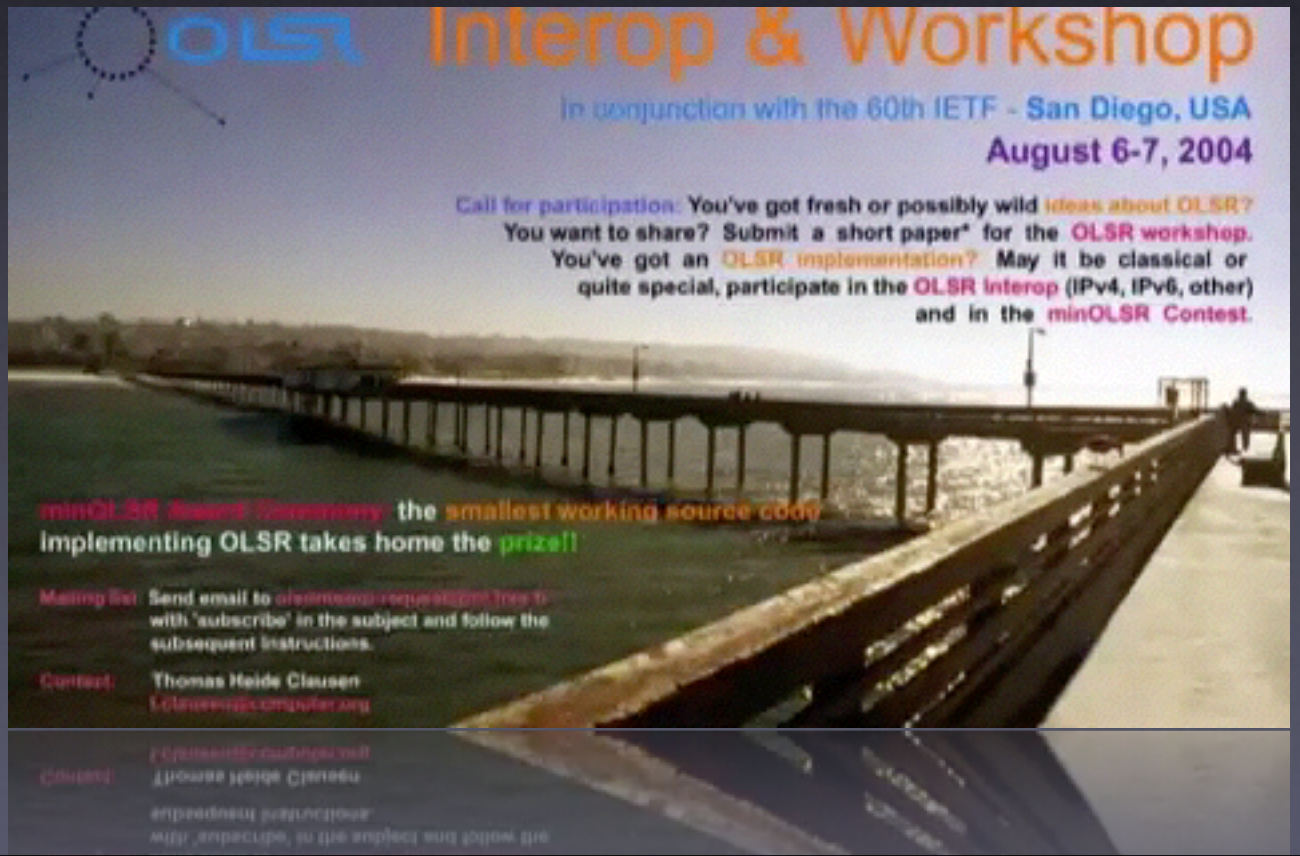

OLSRv2: 2004-2014

- Educational Documents
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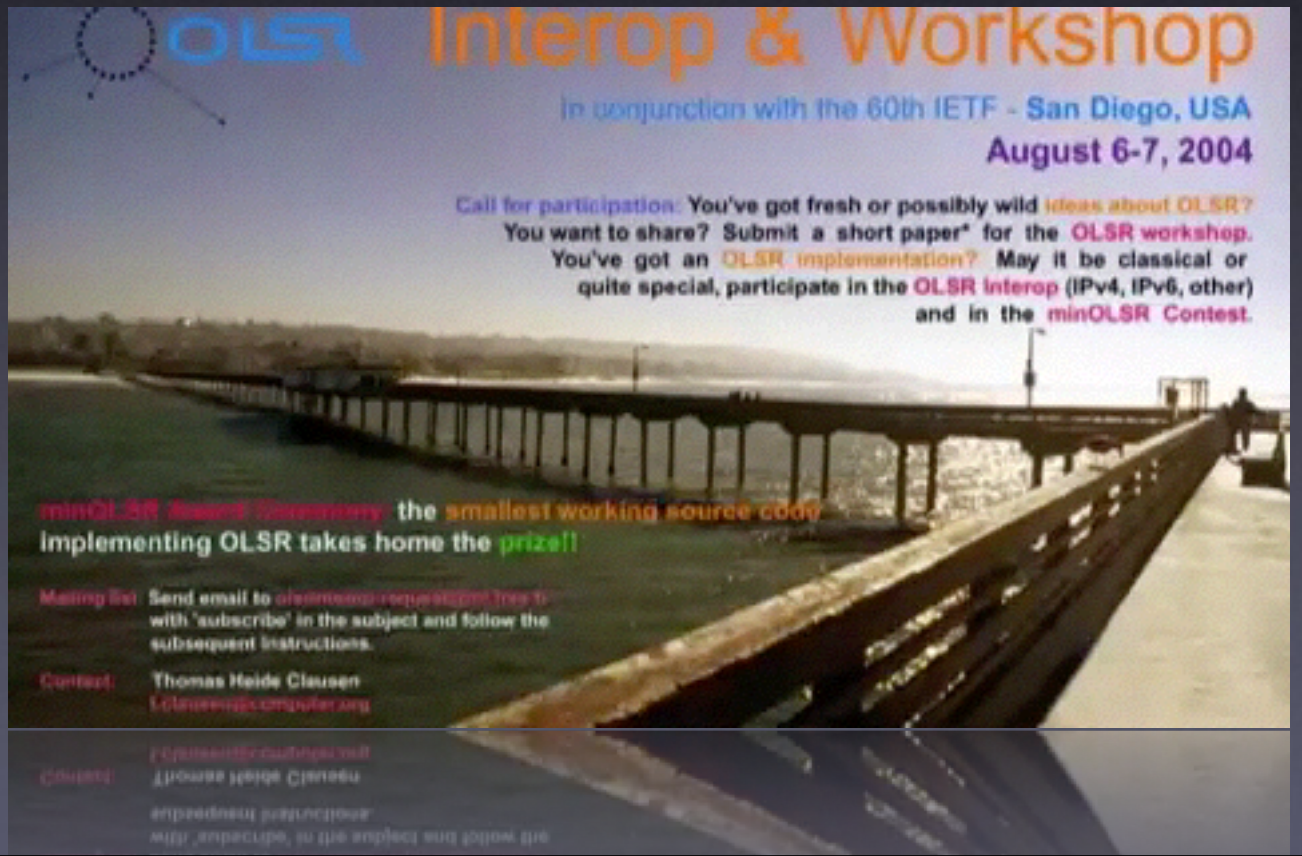

OLSRv2: Maintenance & Extensions

- WG Maintenance Documents
  RFC Ed. Queue: `draft-ietf-manet-olsrv2-rmpr-optimization`
  `draft-ietf-manet-nhdp-olsrv2-tlv-extensions` (we hope…)

- WG Extension Documents
  `draft-ietf-manet-olsrv2-multitopology`

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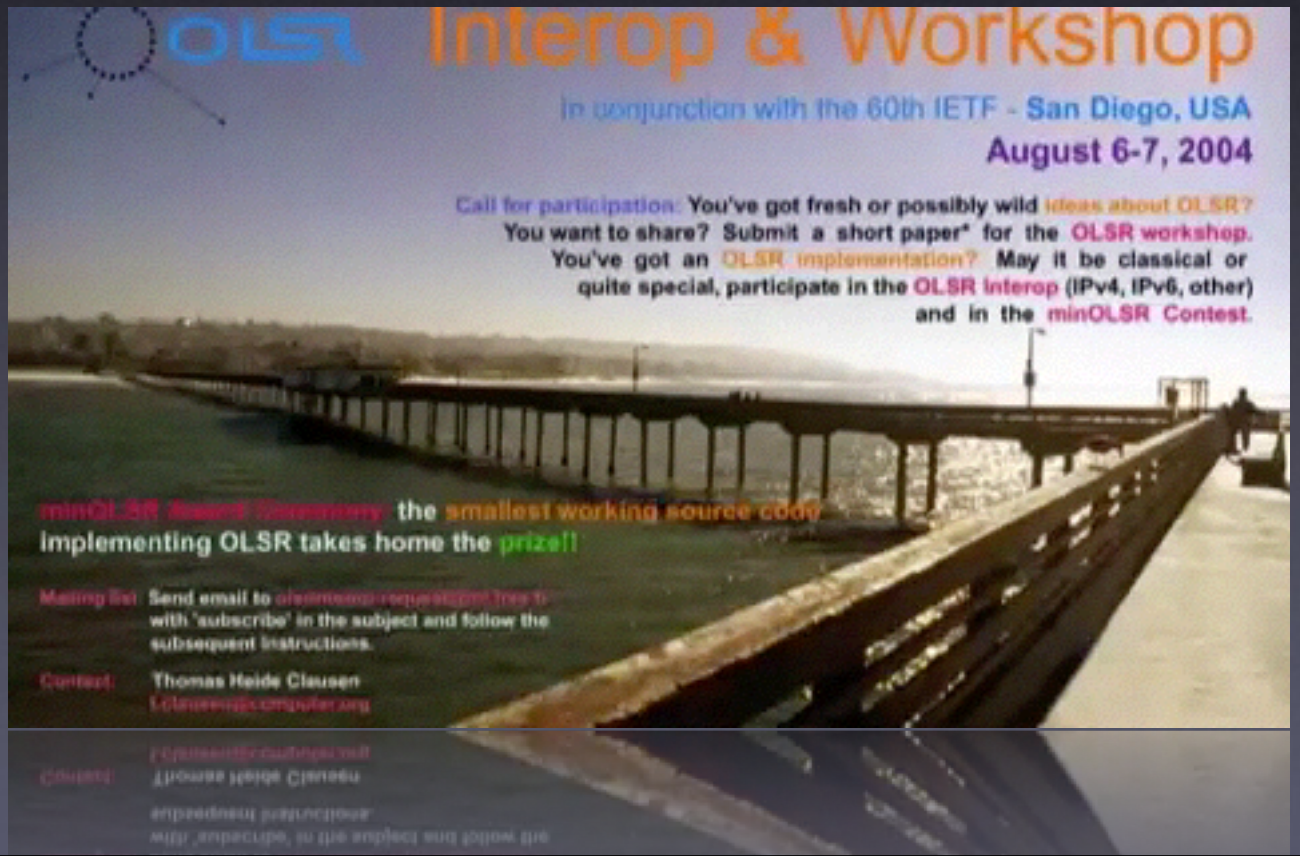

OLSRv2: Maintenance & Extensions

- Non-WG Maintenance Documents
  `draft-dearlove-manet-nhdp-optimization` (new this IETF)
- Non-WG Extension Documents
  `draft-rogge-baccelli-olsrv2-ett-metric`

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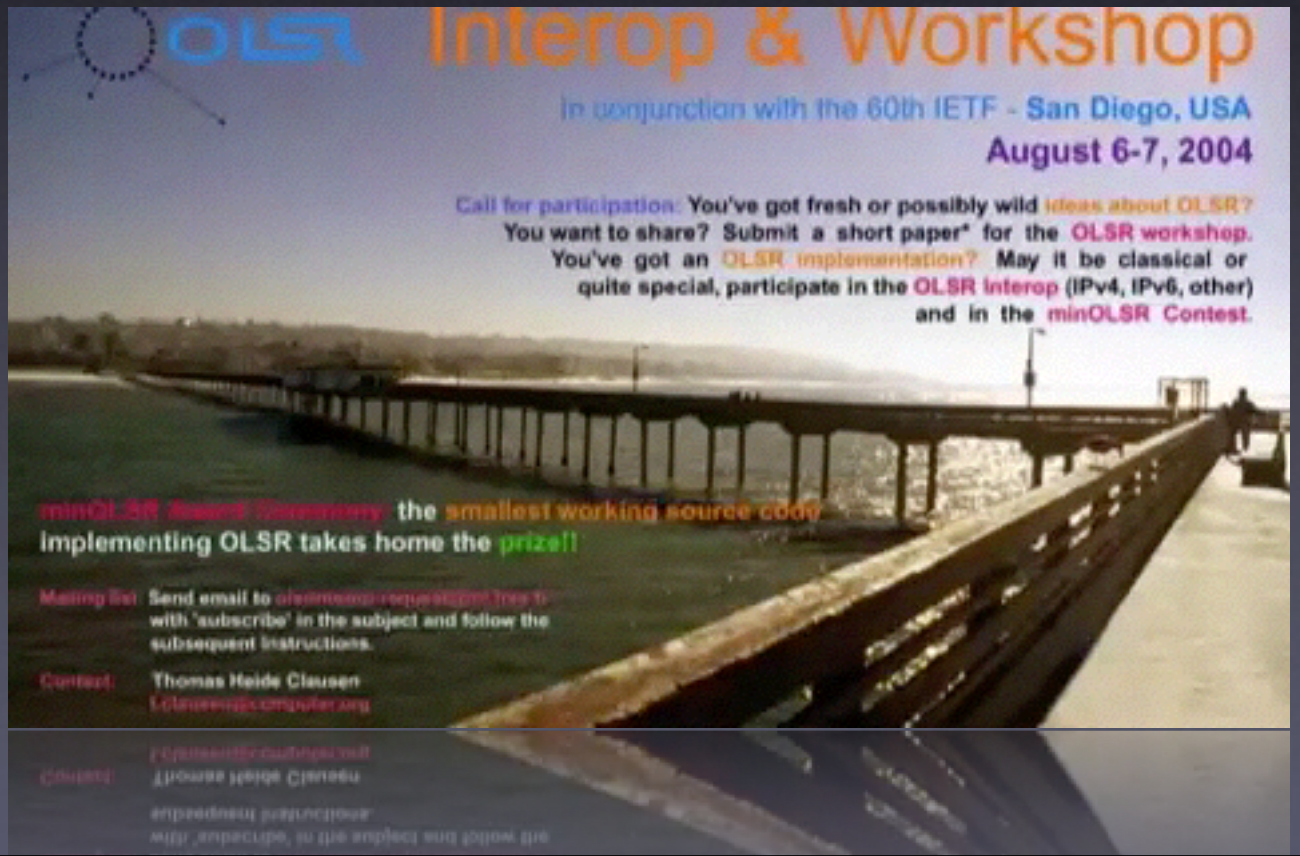

OLSRv2: Maintenance & Extensions

- Non-WG Educational Documents
  `draft-clausen-manet-olsrv2-management-snapshot` (new this IETF)

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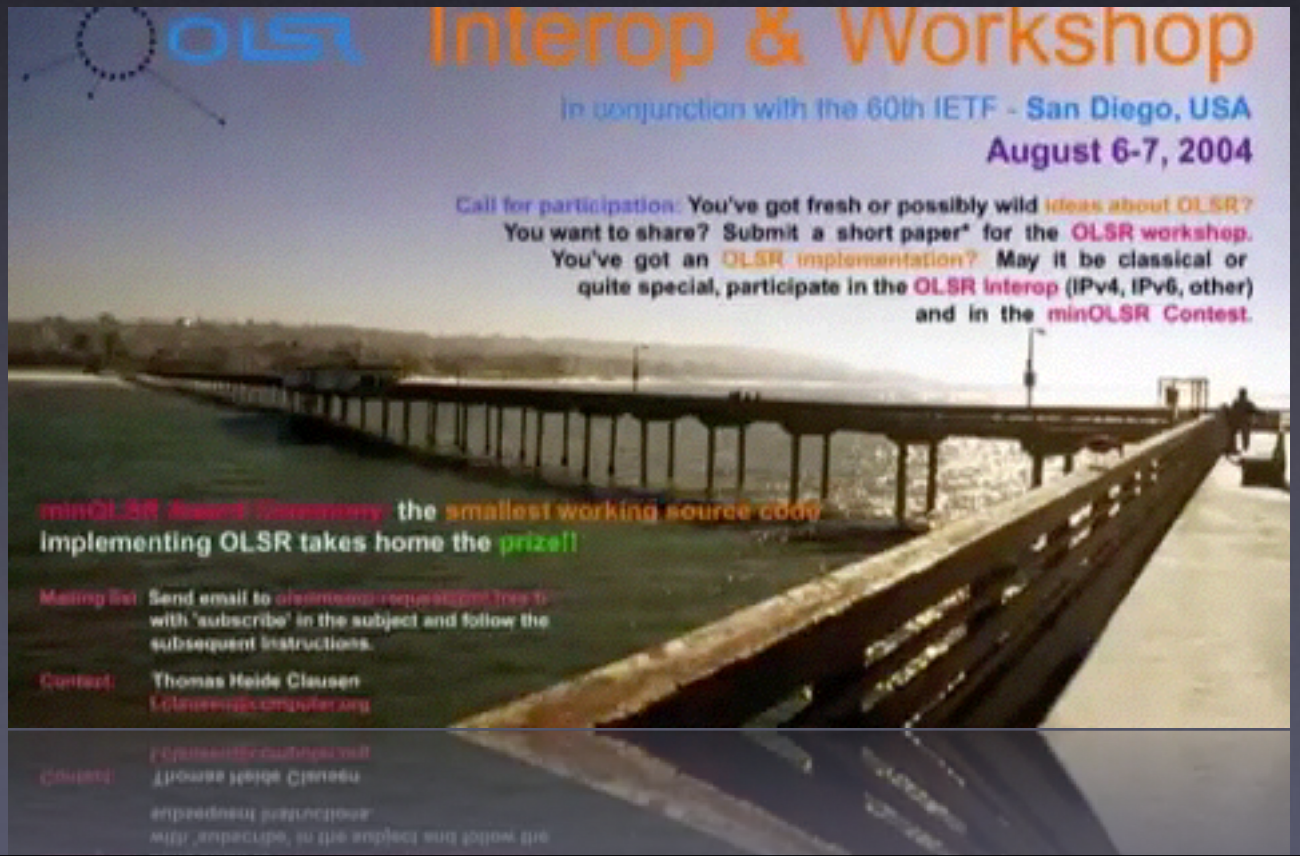

OLSRv2: Document Status Overview

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draft-ietf-manet-olsrv2-rmpr-optimization
draft-ietf-manet-nhdp-olsrv2-tlv-extension

Christopher Dearlove - Thomas Clausen

draft-ietf-manet-olsrv2-rmpr-optimization
Status (2014-03-02)

- On IESG Telechat 2014-02-22 - ballots were:
  1 DISCUSS
  1 YES
  12 NO-OBJECTION

  Conflicting use of normative language in Section 4

- New version issued 2014-02-22 (-01)
  Addressed all comments - Resolved all DISCUSS

- Current document status:
  Sent to RFC Editor. REF dependency on OLSRv2, …

draft-ietf-manet-nhdp-olsrv2-tlv-extension

Status (2014-03-02)

- On IESG Telechat 2014-02-22 - ballots were:
  4 DISCUSS
  0 YES
  9 NO-OBJECTION

- Clarification of IANA considerations:
  - Table description (clear/set bits)
  - Clearer instructions to IANA
- Make more explicit which TLVs can and can't be rejected
- RFC2119 Language Usage

- New version issued 2014-02-24 (-03)
  Addressed all comments - Resolved 3 DISCUSSes

- Current document status:
  Waiting for final approval that IANA considerations are OK
  (working with Adrian Farrel, RTG AD, who holds DISCUSS)

IESG Processing Highlights
(For proceedings, not presentation)

Christopher Dearlove - Thomas Clausen

draft-ietf-manet-olsrv2-rmpr-optimization
IESG Processing Highlight

Berry Leiba / Pete Resnick (DISCUSS):

Conflicting use of normative language in section 4:
These two statements seem in conflict:

> A set of routing MPRs created as specified in [OLSRv2] MAY be optimized in the following manner.
>
> [...]
>
> It is RECOMMENDED that all OLSRv2 routers use this optimization.

The first indicates that the optimization is purely an option. The second indicates that it is a requirement with certain exceptions that may exist. Which do you mean? If the former, I'd suggest just getting rid of both of the 2119 terms (use "can" instead of "MAY" and "suggested" instead of "RECOMMENDED"), since it's only a suggestion. If the latter, change the "MAY" to a “SHOULD".

Resolution:

As there are no “certain expectations” that exist when doing (or not) this, the last sentence has been removed, leaving the “MAY” as appropriate

draft-ietf-manet-nhdp-olsrv2-tlv-extension
IESG Processing Highlights

Berry Leiba (DISCUSS):

The descriptions of Tables 4 and 5 have some similar wording, which I can't make sense out of:

> For all
> future allocations, the Expert Review MUST ensure that allocated bits
> MUST use the unset bit (0) to indicates no information, so that the
> case Value = 0 will always indicate that no information about this
> network address is provided.

Can you explain what this means, and perhaps come up with clearer wording? I honestly have no idea what you're trying to say, and as it's a "MUST", that seems important.

Resolution: (which Berry ultimately suggested):

> For each bit in the field, a set bit (1) means that the address has the
> designated property, while an unset bit (0) means that no information
> about the designated property is provided. For future allocations, the
> Designated Expert has to ensure that this sense is preserved, and,
> in particular, an unset but MUST NOT be used to convey any specific
> information about the designated property.

draft-ietf-manet-nhdp-olsrv2-tlv-extension
IESG Processing Highlights

Benoit Claise (DISCUSS):

Very easy-to-fix DISCUSS:

- section 4.1

> An implementation MUST NOT reject a message because it contains such a TLV.

"such a TLV" is described in the intro text of section 4.1
This sentence is key: this is THE specification, as it contains a MUST, and therefore must be self-contained. Please make clear. For example:

> An implementation MUST NOT reject a message because it contains a unrecognized TLV value.

Resolution:

Benoit's suggestion folded in.

draft-ietf-manet-nhdp-olsrv2-tlv-extension
IESG Processing Highlights

Brian Haberman (DISCUSS):

I have no objection to the publication of this document, but I have two points that need discussing. These should be easily addressed.

1. Section 4 has the following text:

```
This specification describes how NHDP [RFC6130] and OLSRv2
[OLSRv2] SHOULD handle TLVs with other TLV Value fields.
```

I am not sure why there is a "SHOULD" here. *If* there was a need for a 2119 keyword, I believe a "MUST" is in order. However, I don't think a 2119 keyword is needed at all. I suggest replacing that sentence with:

```
This specification describes how NHDP [RFC6130] and OLSRv2
[OLSRv2] handle TLVs with other TLV Value fields.
```

Resolution:

Folded in Brian's suggestion

draft-ietf-manet-nhdp-olsrv2-tlv-extension
IESG Processing Highlights

Brian Haberman (DISCUSS):

I have no objection to the publication of this document, but I have two points that need discussing. These should be easily addressed.

2. In Section 4.3.1, the text talks about creating an IANA registries to manage the allowed values in the various TLVs. The second paragraph then says

> An implementation of [RFC6130], receiving a TLV with any TLV Value other than those values used in that specification, MUST ignore that TLV Value and any corresponding attribute association to the address.

Shouldn't the guidance be that values not in the *registry* are ignored?

Rebuttal:

What's important is that an implementation must ignore any value it doesn't understand. At some future point an extension could add a meaning for a value and have it put in the registry. The existing implementation's requirement is unchanged by that, but is no longer to ignore any value not in the registry. In fact we already have a case that uses that - the UNSPECIFIED values are there to (in effect) be always ignored

Resolution:

An implementation of [RFC6130], receiving a LOCAL_IF, LINK_STAUS, or OTHER_NEIGHB TLV with any TLV Value other than the values which are defined in [RFC6130] MUST ignore that TLV Value, as well as any corresponding attribute association to the address.

draft-ietf-manet-nhdp-olsrv2-tlv-extension
IESG Processing Highlights

Stephen Farrel (Comment) - fixed

Table 4 values 1 and 2 have the same text

Benoit Claise (Comment) - fixed by removing 2nd sentence

```
This document updates the specification of the protocols
[OLSRv2] and [RFC6130].  As such it is applicable to all
implementations of these protocols.
```

What does the second sentence add? Isn't it obvious if this document updates [OLSRv2] and [RFC6130]? Maybe I'm missing a subtle concept?

NHDP Optimization

Christopher Dearlove

An NHDP optimization

An Optimization for the MANET Neighborhood Discovery Protocol (NHDP)

draft-dearlove-manet-nhdp-optimization-00

- Note that this is *an* optimization, a small but occasionally useful one.
- It relates to link quality, not link metrics – the latter is an OLSRv2 concept.
- The objective is to reduce disruption when link quality changes, in particular goes down and then back up.
  - Do not have to wait for another router when the cause is local.

Link quality based link loss

What already happens.

Two routers, A and B. A considers that B is HEARD, or perhaps SYMMETRIC.

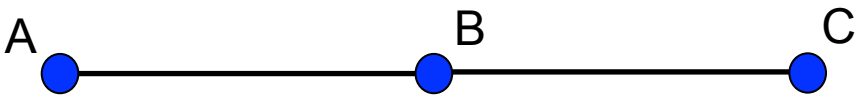
A decides that the link quality is too poor to use the link. It marks the link as LOST (with L_lost = true).

But A retains knowledge of the link.

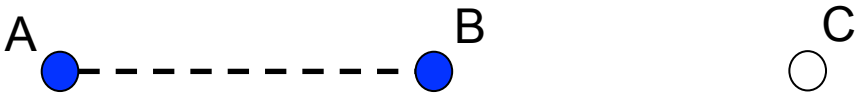
This is A's view, dashed = known, unused

Two-Hop Neighbour

Now suppose that the link was symmetric, as also was a link from B to C.



When A decides that the link from B is no longer of high enough quality, it discards the link between B and C.

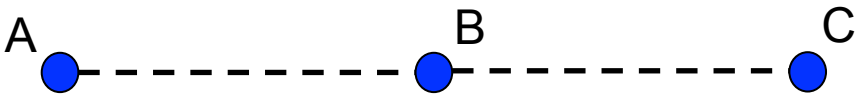


This is A's view,
empty = forgotten

An optimisation

It would be better if A retained that knowledge:

- If A changes its mind about B, then C is immediately available again.



This is A's new view while link to B is poor

And this is what this optimisation does.

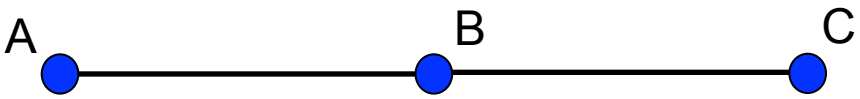
Status of the optimization

This is actually completely legal using NHDP as defined.

- But if you do it in the obvious way (extend 2-Hop Tuples) then you have changed the interface to NHDP as used by, for example, OLSRv2.
- Two options:
  - Do this, but keep details internally hidden.
  - Define this, and how OLSRv2 etc. should now use NHDP.
- Draft does latter, but mentions former.

One more point

There is one more case that is not mentioned:



What if, in the above case, it is B that decides that the link from A is too poor to use?

This is what results.

This is A's view

Is this a problem for A? No, because if B changes its mind again, then when it re-advertises that it hears A, it will also re-advertise C, and thus A can immediately recover.

Multi-Topology OLSRv2

Christopher Dearlove
Thomas Clausen

History

draft--dearlove--manet--olsrv2-multitopology--01

- July 2013.
- Presented at Berlin (IETF 87).

draft--dearlove--manet--olsrv2-multitopology--02

- December 2013.
- Changes described on following slide.

draft-ietf-manet-olsrv2-multitopology-00

- After acceptance as WG draft, February 2014.
- Same as previous draft.
- Aim is Experimental RFC.

Changes from -01 to -02/-00

Assumes draft-ietf-manet-nhdp-olsrv2-tlv-extension:

- Only IANA and RFC Editor to go.

Completed specification by including:

- Routing MPR willingness per metric/topology.
  - Extended MPR_WILLING TLV.
- Attached network number of hops per metric/topology.
  - Extended GATEWAY TLV.
- Added IANA Considerations section.
- Editorial changes.

Still not done

Security considerations

Acknowledgements – we will have some.

Recap of assumptions

Creates multiple topologies.

Each topology is defined by an OLSRv2 metric.

- No preconfiguration needed to be well-defined.
- Some management needed to work well.

Each topology creates a Routing Set (IP routing table).

Each packet is sent using a single topology end to end.

- Outside scope how, for example DSCP.

Will interwork with unextended OLSRv2.

- Requires draft-ietf-manet-nhdp-olsrv2-tlv-extension.

Topologies need not be complete – by design.

Plan

Agree technical details.

Complete draft:

- Any required changes (none currently known).
- Missing sections.
- “Wordsmithing”.

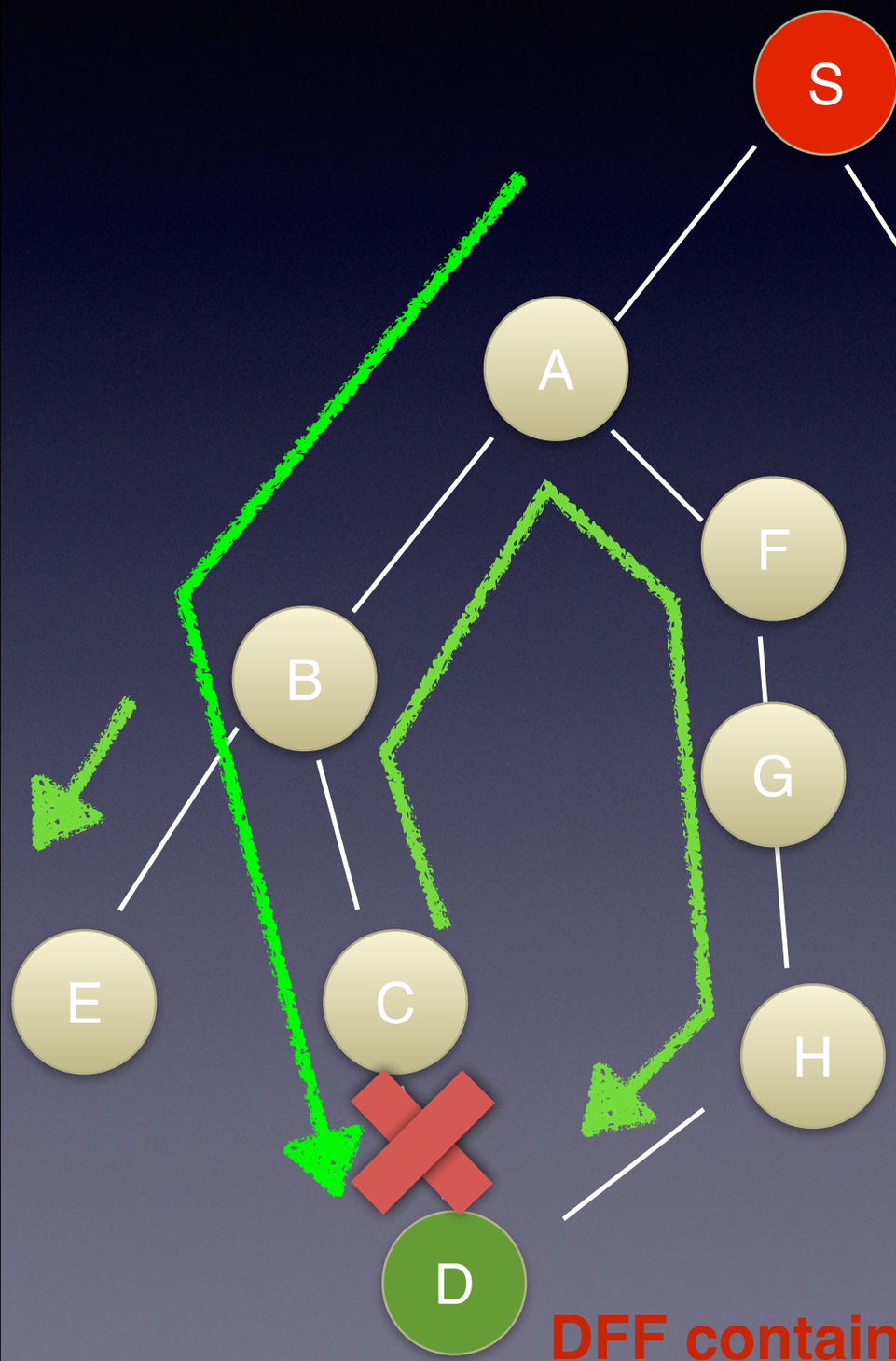
Take to Experimental RFC.

- Want implementation(s) to experiment with.

“Success Before Convergence”

Jiazi Yi - Thomas Clausen
(w/ Ulrich Herberg, Laurent Anadon, Guillaume Pagès, Antonin Bas)

RFC 6971:Depth-First Forwarding (DFF) in Unreliable Networks

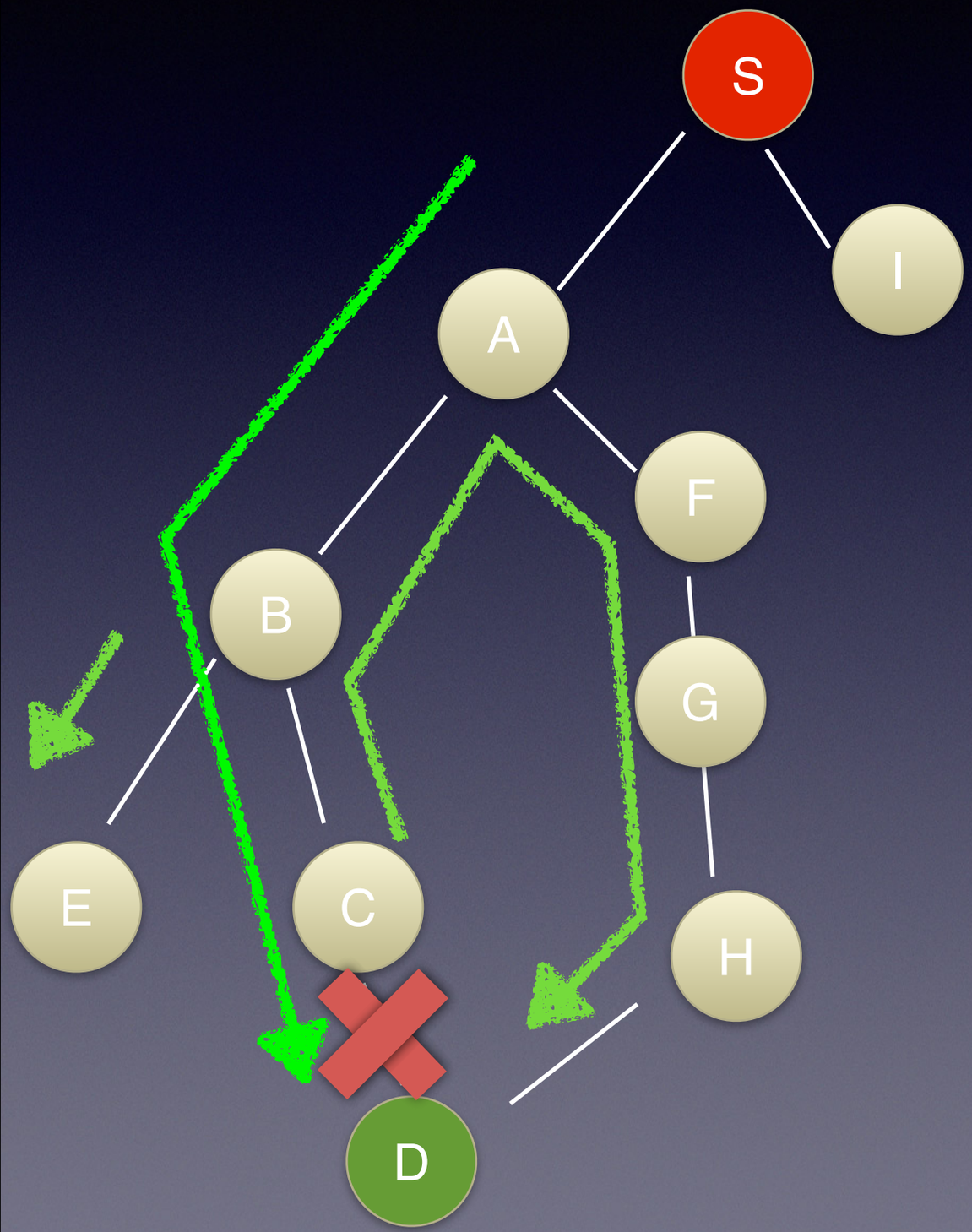


For each packet:

1. Create Candidate Nexthop List (CNL):
   `( Next-hop from routing table, {other neighbors}\prev.hop )`
2. Forward to first element in CNL
3. Possible outcomes:
   A. If CNL empty: return packet to prev. hop
   B. If success (L2-ACK) & neighbour is destination for packet: stop
   C. If failure (no L2-ACK): remove head entry from CNL, resume at 2
   D. If success (L2-ACK) & neighbour is not destination for packet & packet returned by neighbor: remove head entry from CNL, resume at 2
   E. If success (L2-ACK) & neighbour is not destination for packet, that neighbour will execute this procedure, starting at 1

DFF contains loop-detection mechanisms - read RFC for details

“DFF++”

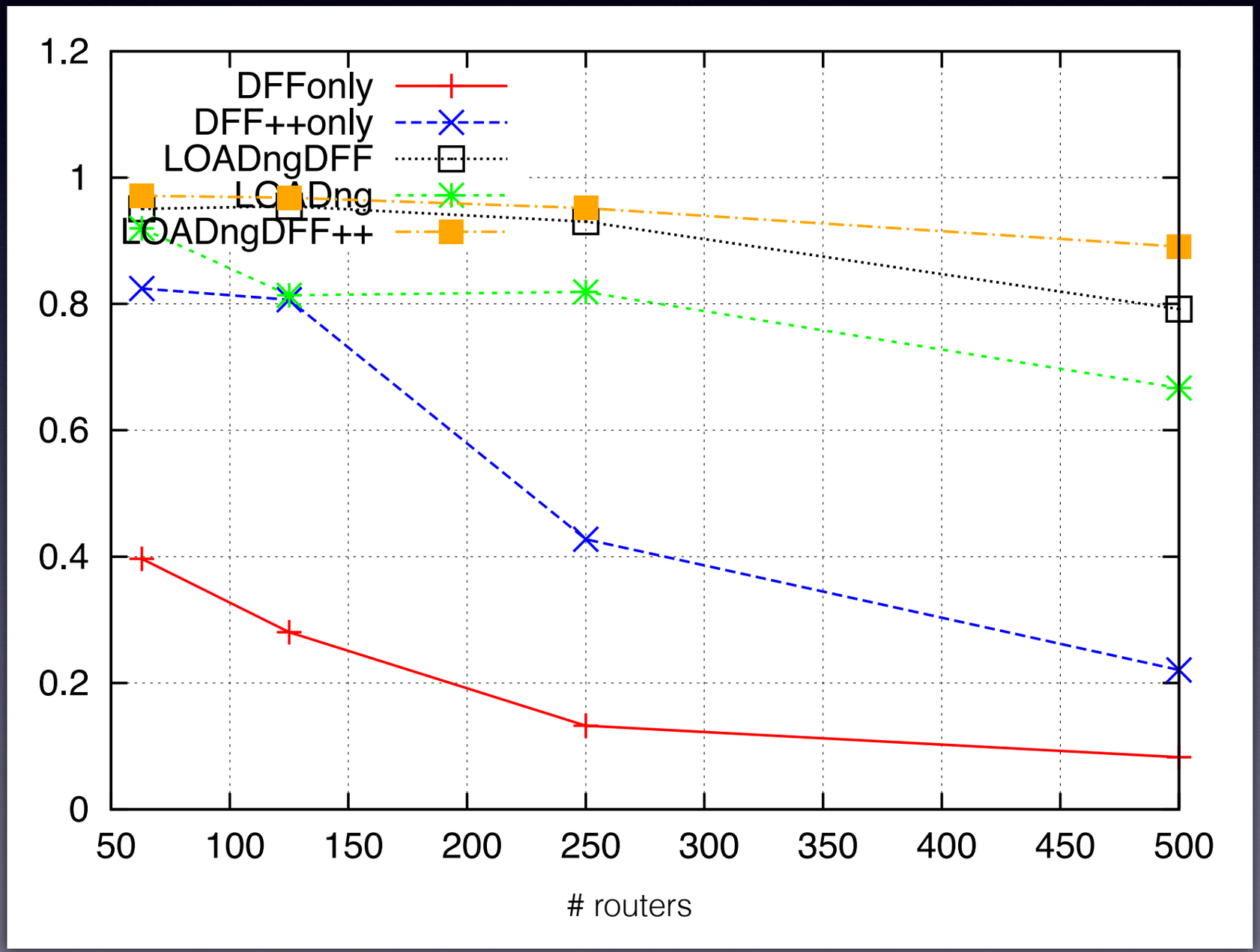


- Add *transient* routing table (“learn from past failed delivery attempts”)
  - For each forwarded packet, record destination, neighbours tried
  - Use this for when ordering CNL
- Reflected by 1 element in DFF loop detection tuple + ordering constraint

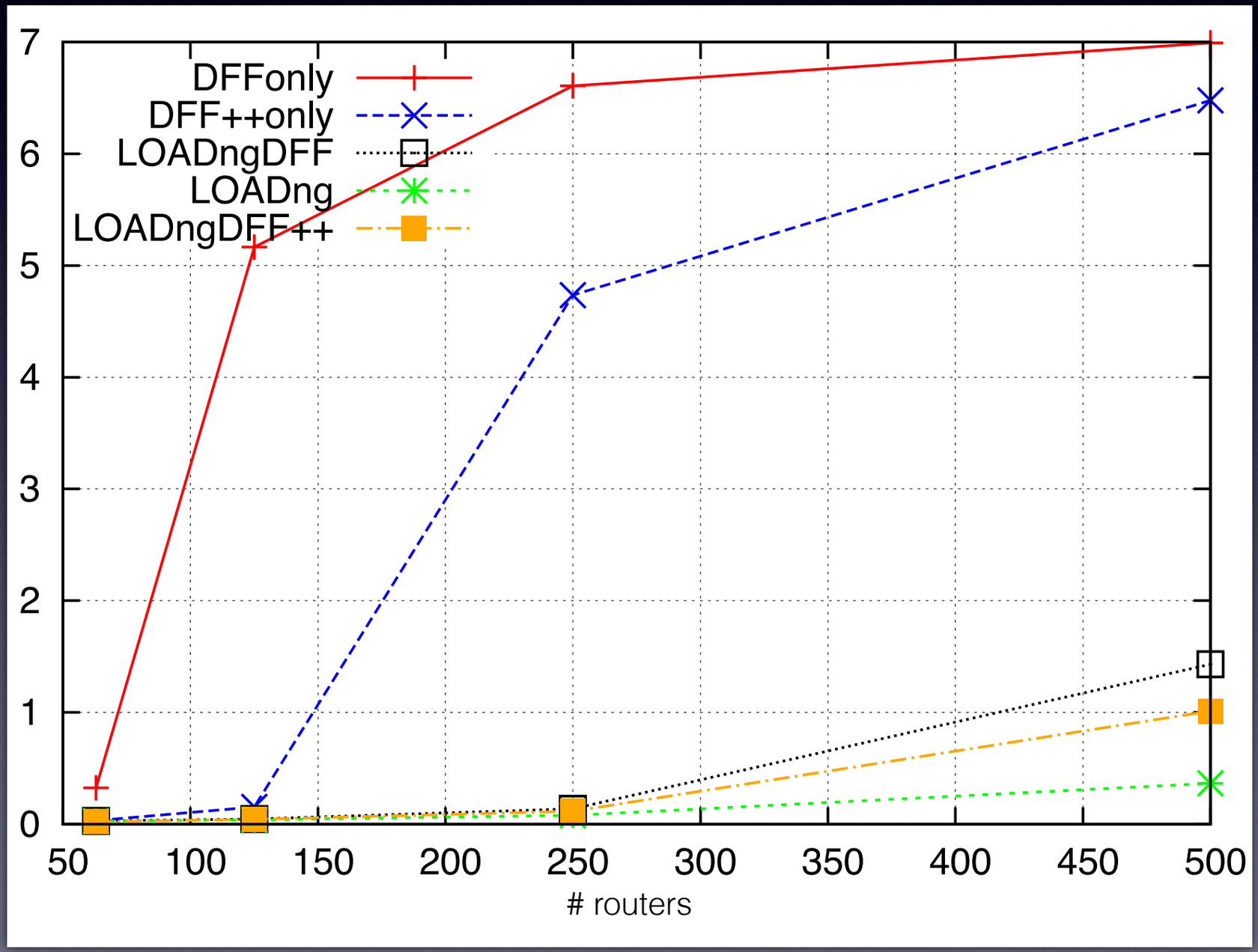
DFF/DFF++ Reactive Protocols

- Additional neighbourhood discovery mechanisms required, like NHDP
- CNL: RT + (unsorted) neighbour set
- On data packet forwarding failure, DFF is triggered (in addition to route error/repair)
- Results presented here: fixed density network, highly lossy links: for each packet, 20% loss probability

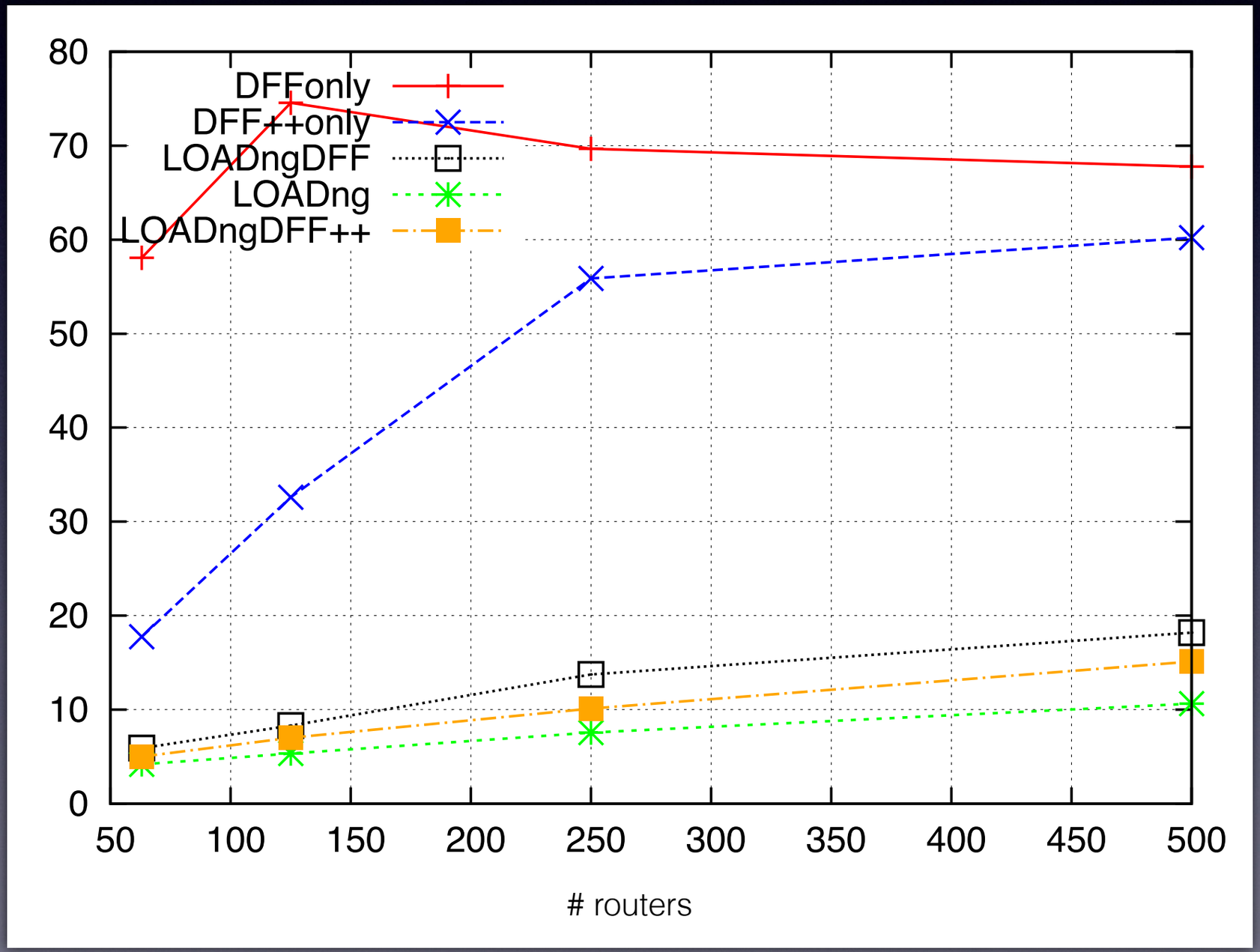
Reactive Protocol Data Delivery Ratio



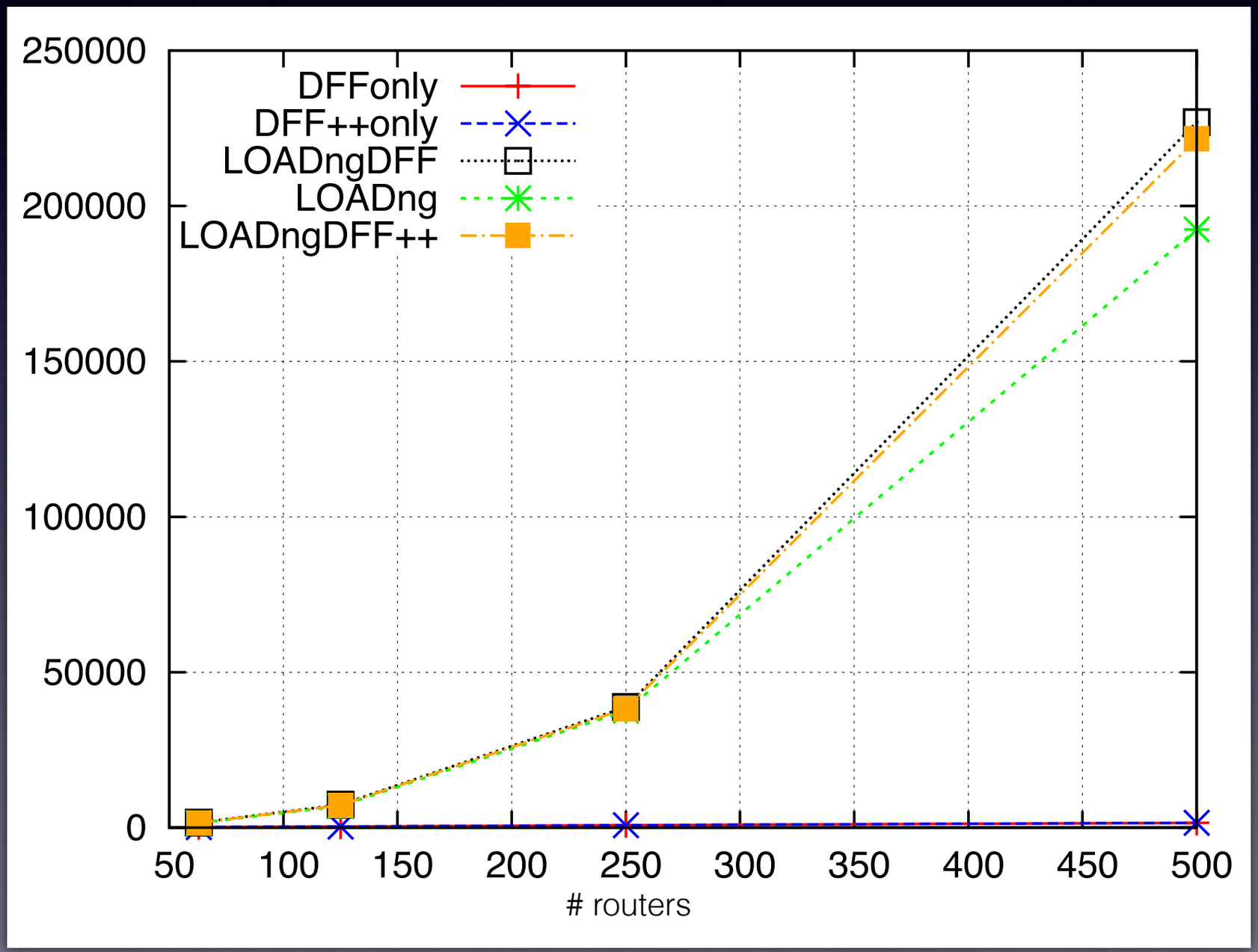
Reactive Protocol Data Delivery Delay (sec)



Reactive Protocol Path Length (hops)



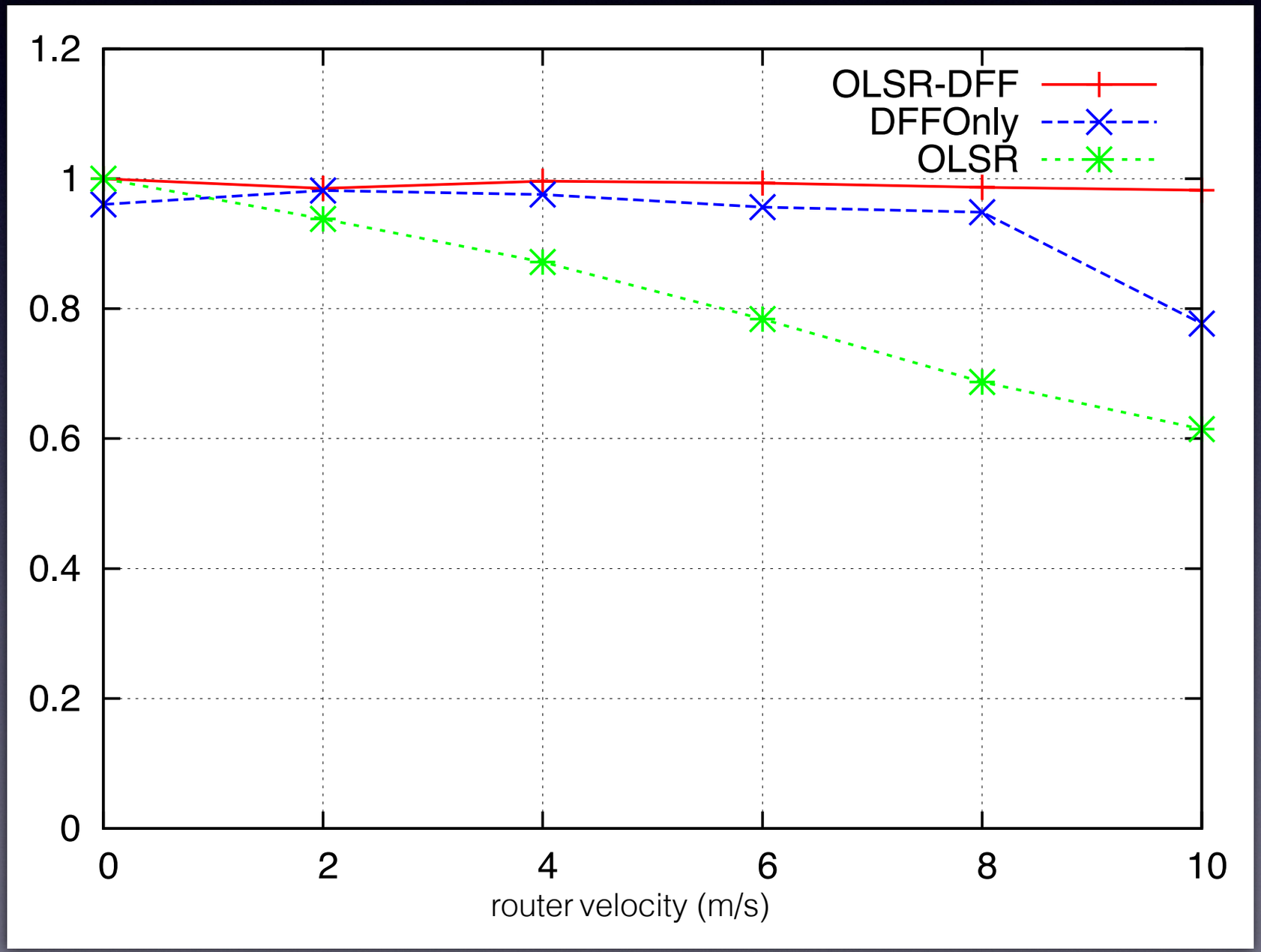
Reactive Protocol Ctrl Traffic Overhead (bytes/s)



DFF/DFF++ Proactive Protocols (OLSRv2)

- NHDP already present
- CNL: RT + (unsorted) neighbour set
  - Note: could do better heuristics, e.g., remove next-hop from topology graph, rerun dijkstra, alas, computational cost
- On data packet forwarding failure, DFF is triggered (no triggered route repair in OLSRv2)
- Results presented here: 50 nodes in 1000*1000 grid, varying mobility
  "Success before convergence"

OLSRv2
Data Delivery Ratio



OLSRv2
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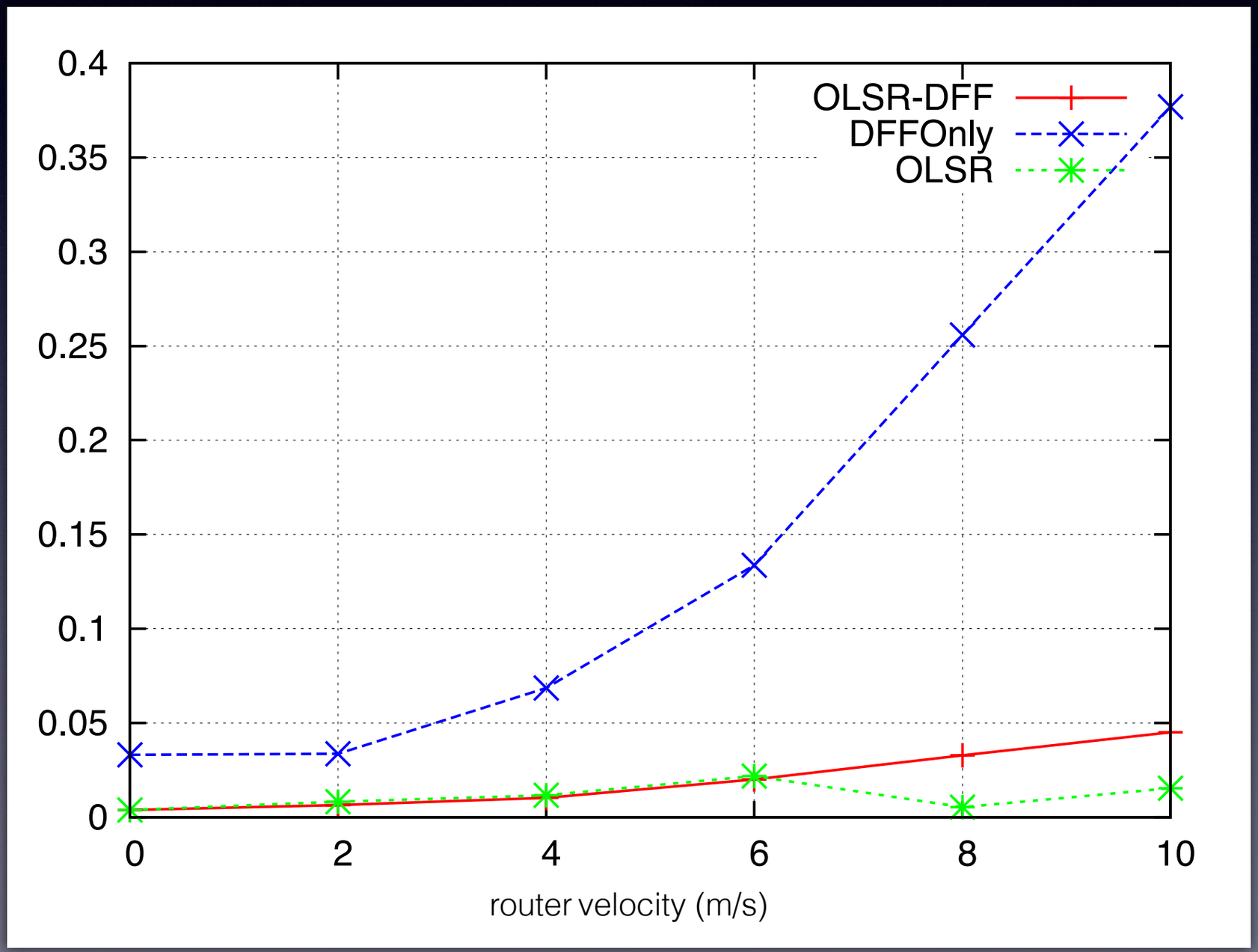
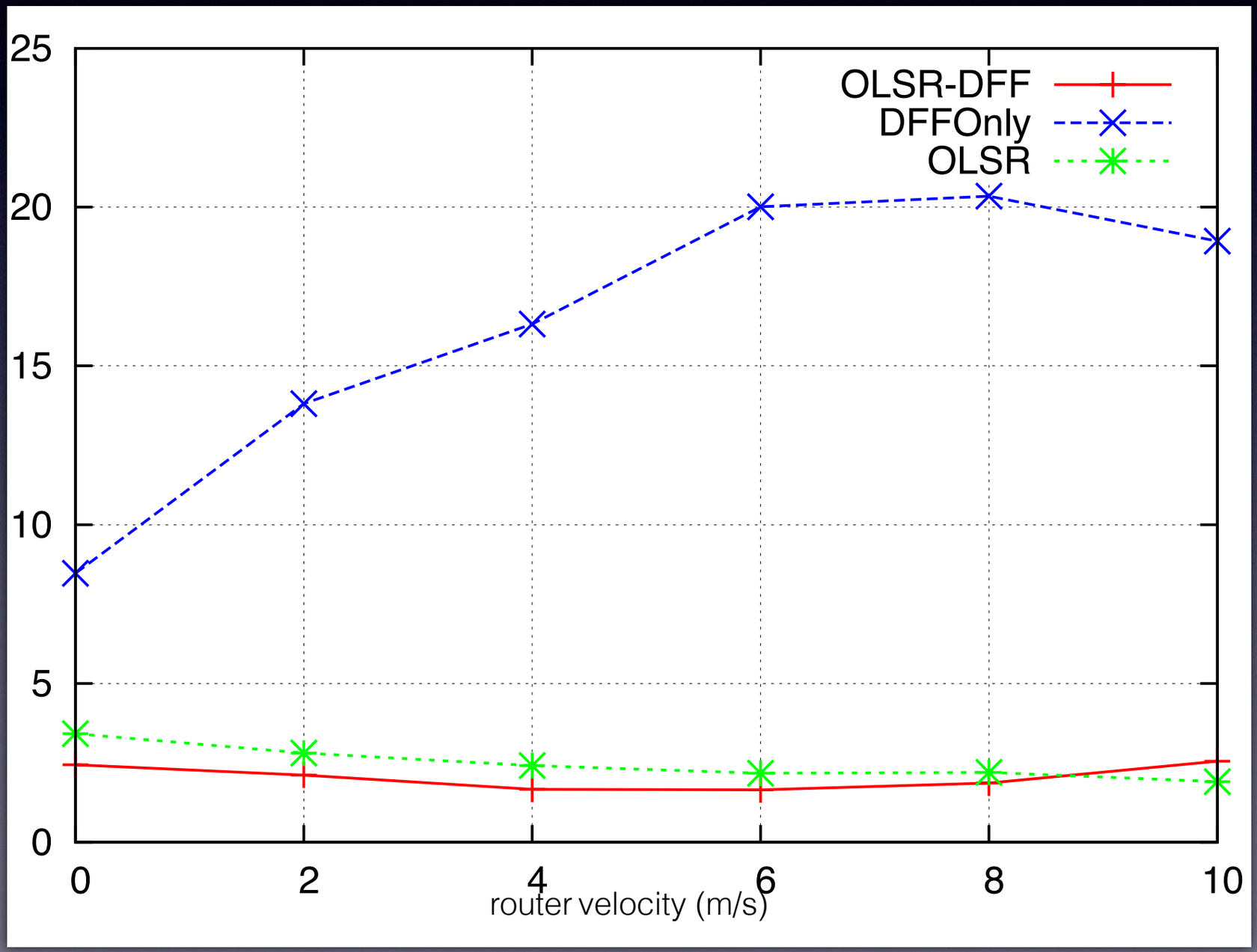


OLSRv2
Path Length (hops)



Concluding Remarks

- Point the WG to potential gains from RFC6971
- Complementary to routing: *“Success before convergence”*
- Encourage more experimental data on this front
- Not recommending any WG action *at this juncture*
- *A*dditional “tricks”, such as DFF++, CNL heuristics possible - could eventually lead to WG actions

“A Depth First Forwarding (DFF) Extension for the LOADng Routing Protocol”
Sixth International Workshop on Autonomous Self-Organizing Networks
Thomas Clausen, Jiazi Yi, Antonin Bas, Ulrich Herberg

“Depth First Forwarding for Low Power and Lossy Networks: Application and Extension”
IEEE World Forum on Internet of Things WF-IoT 2014 (Accepted)
Jiazi Yi, Thomas Clausen, Ulrich Herberg