The case for an informed path selection service

(draft-bonaventure-informed-path-selection-00.txt)

IDIPS: ISP-Driven Informed Path Selection

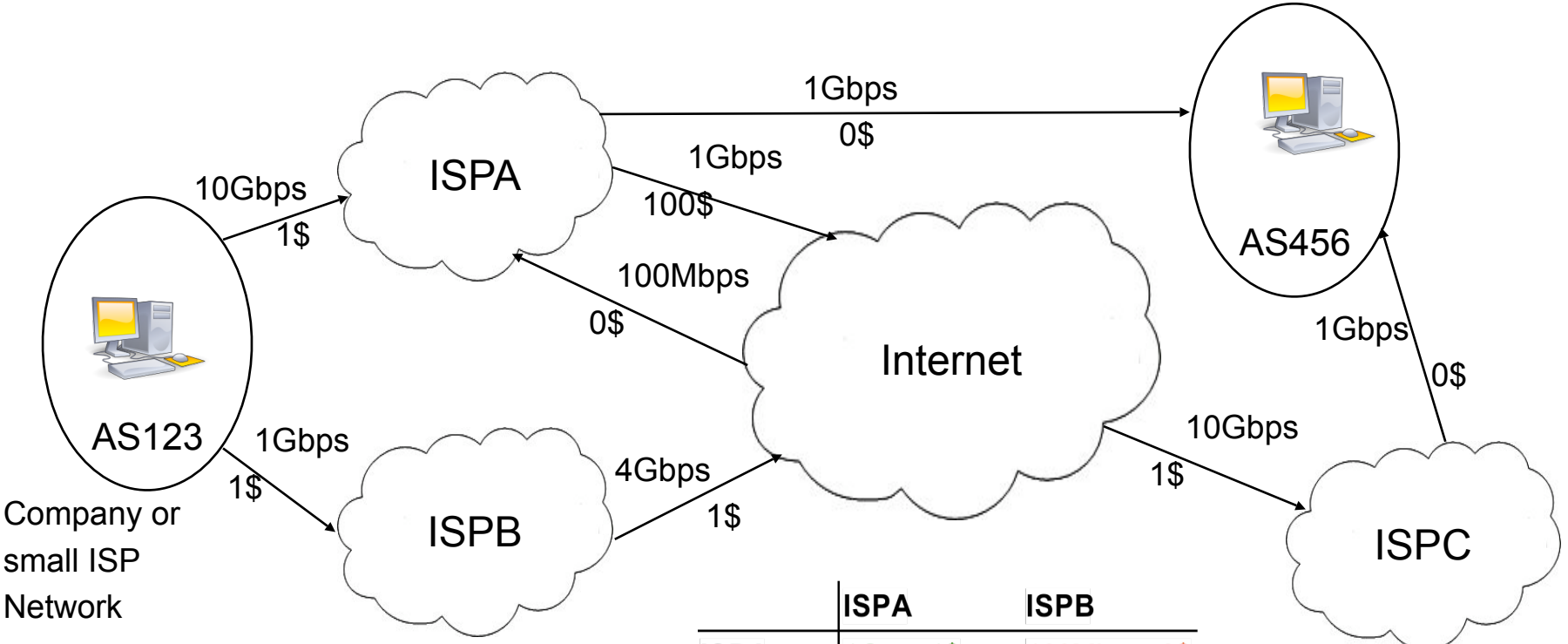
(draft-saucez-idips-00.txt)

O.Bonaventure - D. Saucez - B. Donnet

The choice of the paths is important

- Multiple source addresses
- Multiple destination addresses

=> Paths with different performances and costs



	ISPA	ISPB
ISPA	1Gps, 1$	100Mbps, 2$
ISPC	1Gps, 102$	1Gps, 3$

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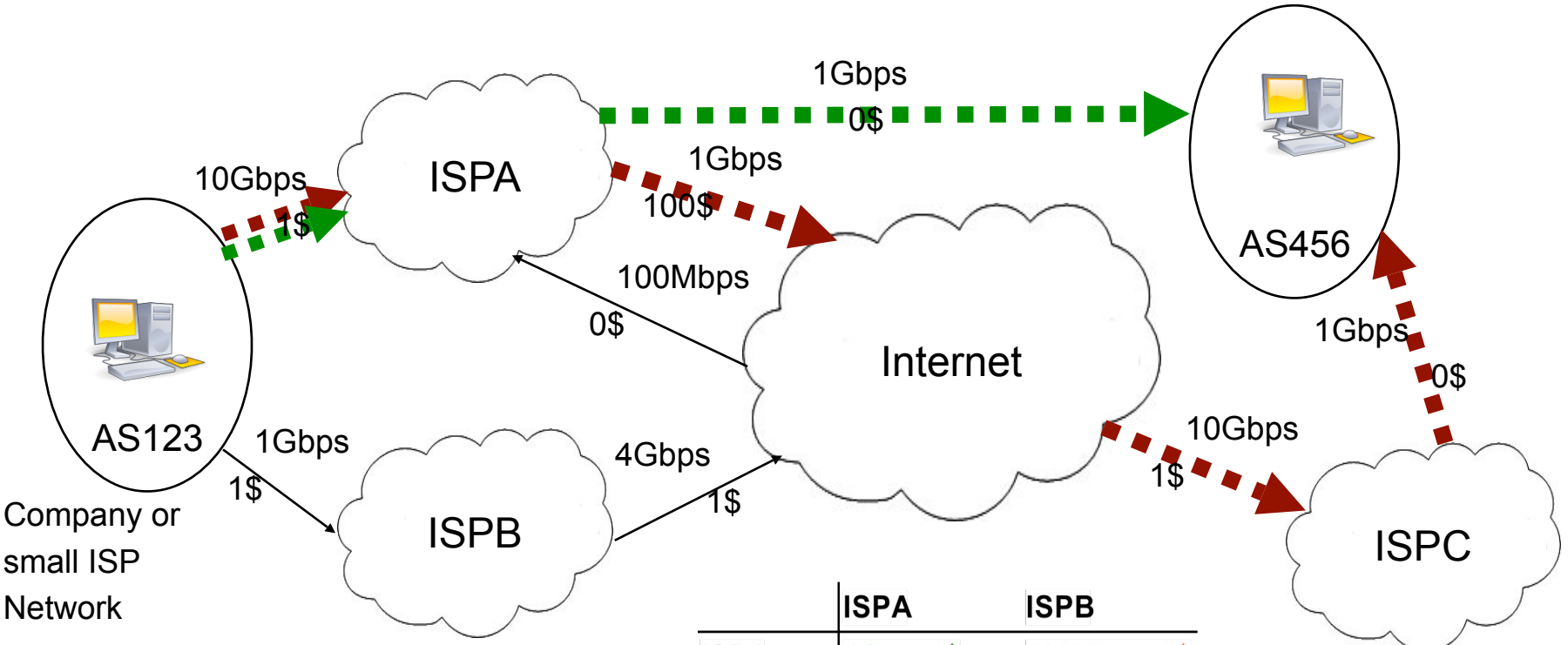

	ISPA	ISPB
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ISPC	1Gps, 102$	1Gps, 3$

TE requirements

Multihomed networks are confronted to TE requirements [15]:

- **Case 1: Primary/Backup**
- **Case 2: Load Sharing across links**
- **Case 3: Best Path**

[15] Schiller, J., "Inter-AS Traffic Engineering Case Studies as Requirements for Ipv6 Multihoming Solutions", NANOG 35, May 2005

Case 1: Primary/Backup

Shim6 uses backup links only when primary are not available.

- **possible with RFC3484 [13] but...**
- **... hard to maintain on large networks**

[13] Draves, R., "Default Address Selection for Internet Protocol version 6 (Ipv6)", RFC3484, February 2003

Case 2: Load Sharing

Shim6 should prefer one path over the other.

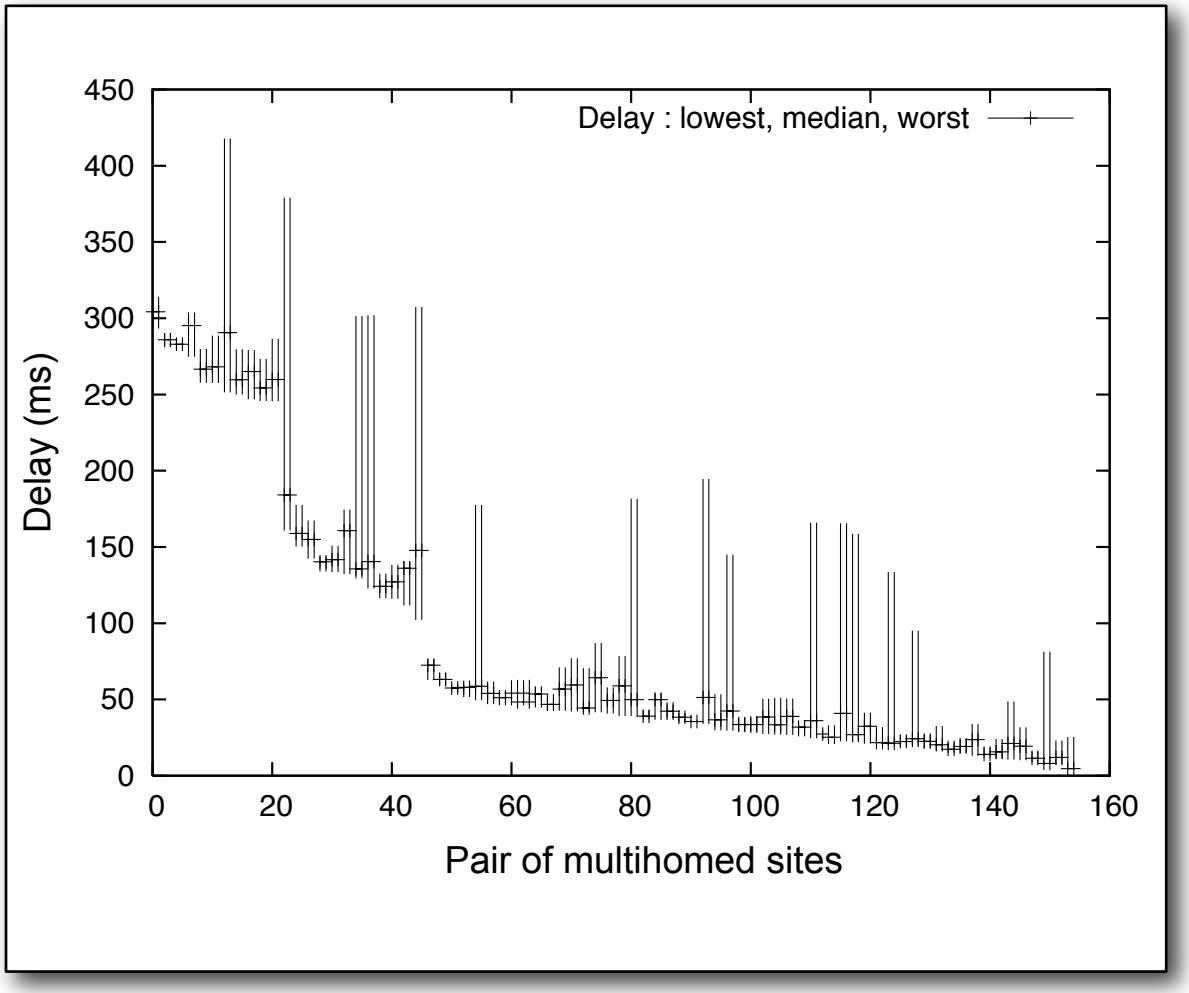
possible with RFC3484 [13] but...

... the preferences are static

... how to dynamically move traffic from one link to the other?

... how to coordinate hosts choices?

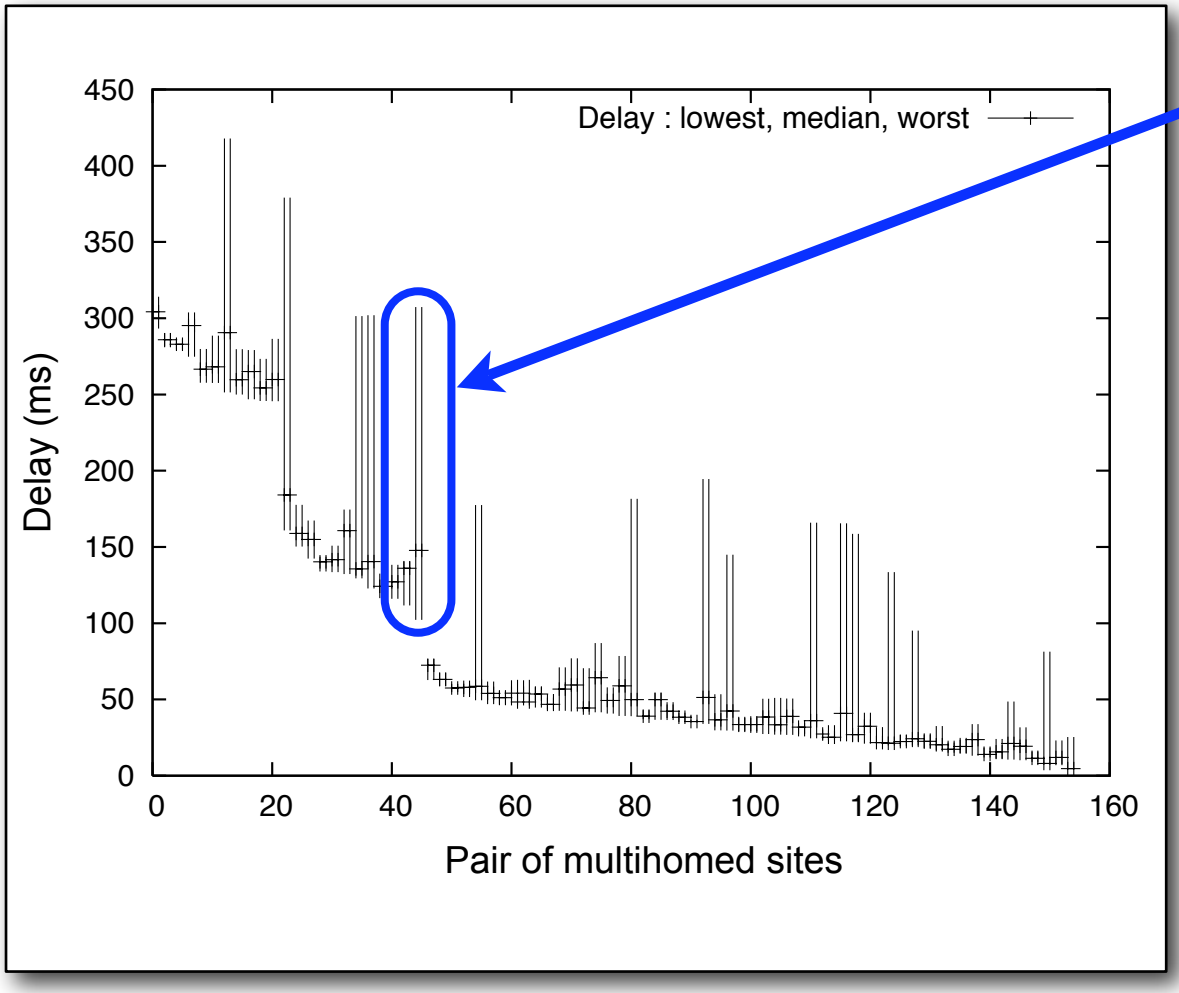
Case 3: Best Path



Observation : Feasible paths have much varying properties

Source: *Evaluating the Benefits of the Locator/Identifier Separation.* B. Quoitin, L. Iannone, C. de Launois, O. Bonaventure. The 2nd ACM International Workshop on Mobility in the Evolving Internet Architecture (*MobiArch'07*)

Case 3: Best Path



Pair 45:

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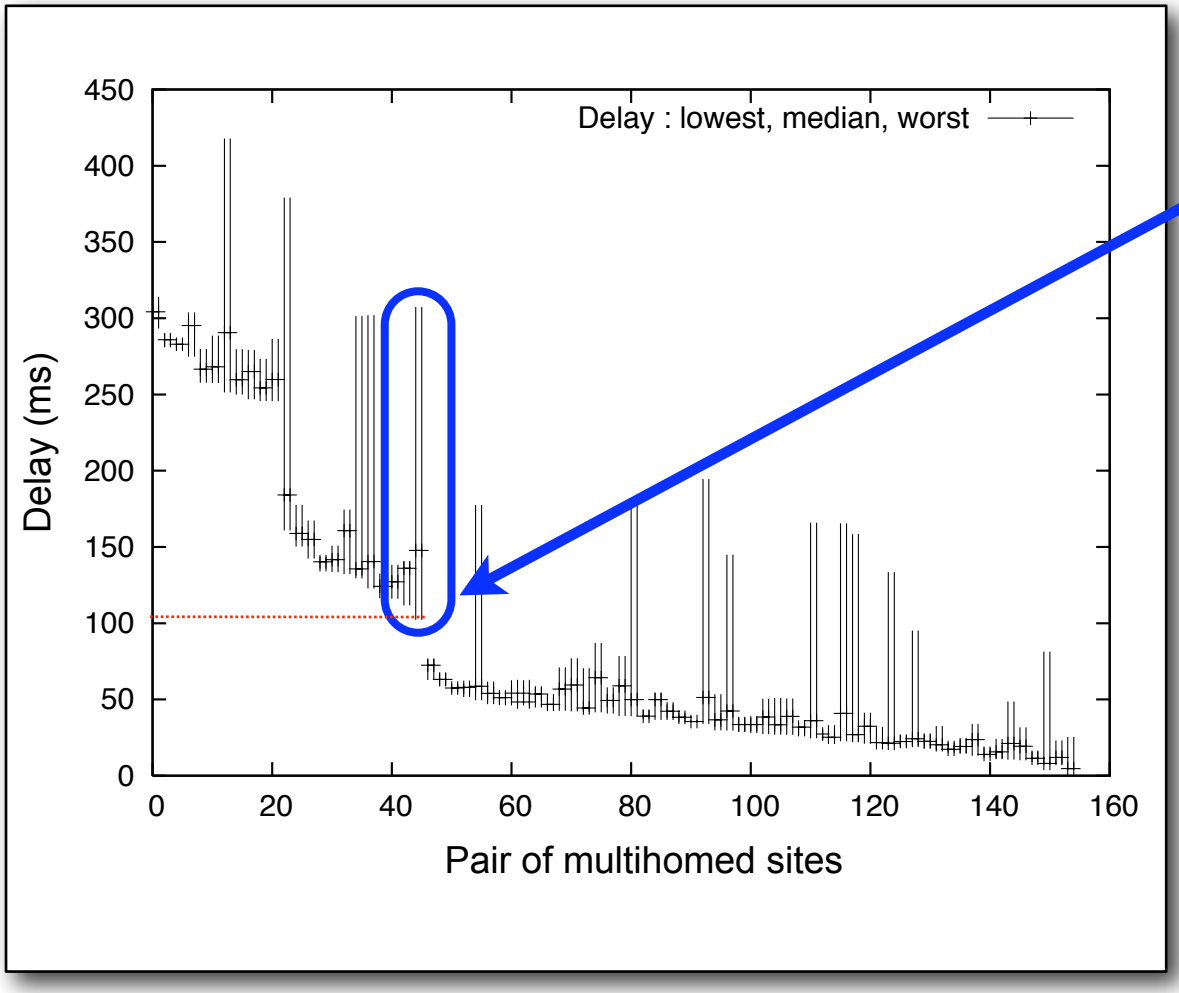
Case 3: Best Path



Pair 45:

Best Path: ~100 ms

Observation : Feasible paths have much varying properties

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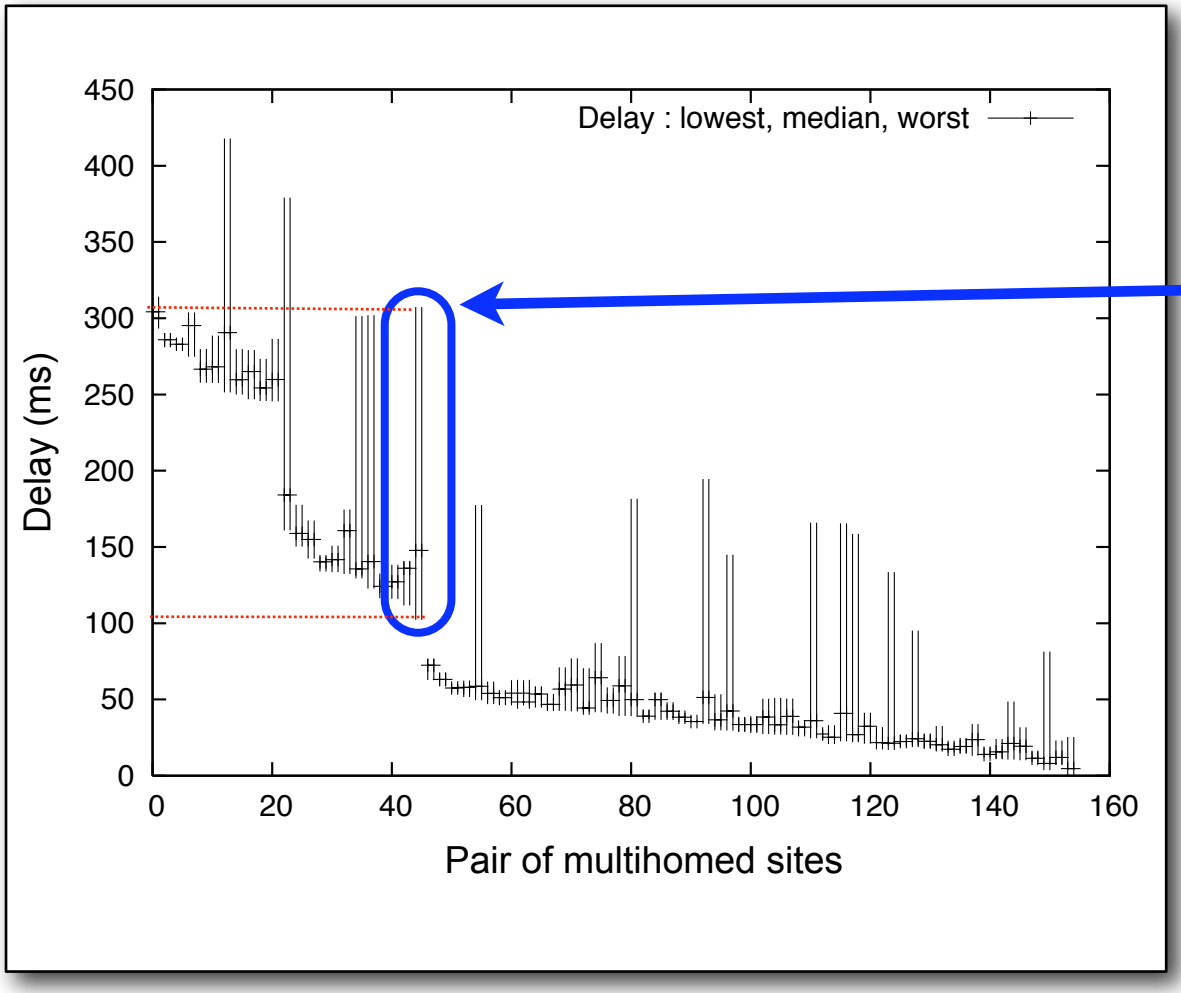
Case 3: Best Path



Pair 45:

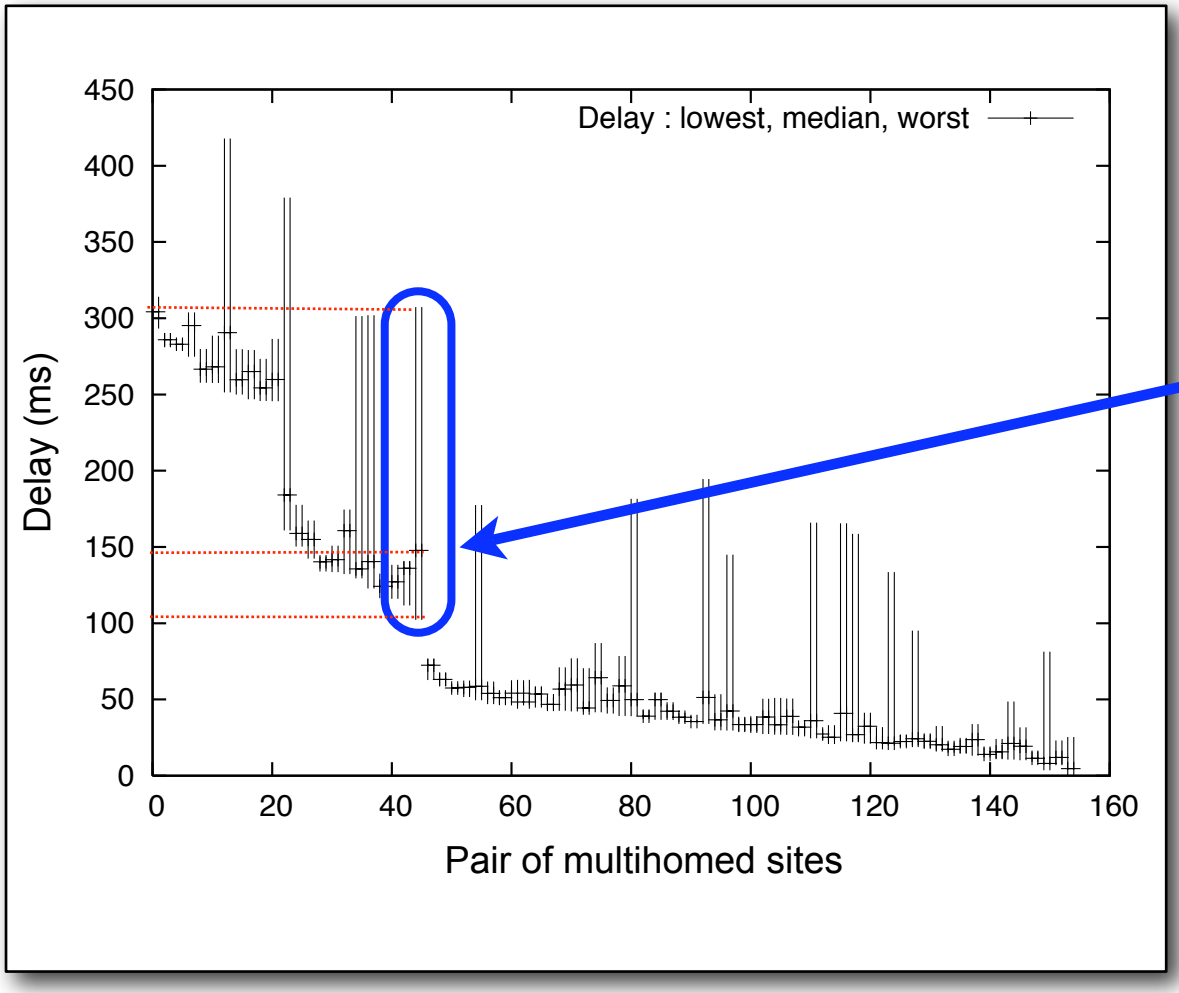
Best Path: ~100 ms

Worst Path: ~300 ms

Observation : Feasible paths have much varying properties

Source: *Evaluating the Benefits of the Locator/Identifier Separation.* B. Quoitin, L. Iannone, C. de Launois, O. Bonaventure. The 2nd ACM International Workshop on Mobility in the Evolving Internet Architecture (*MobiArch'07*)

Case 3: Best Path



Pair 45:

Best Path: ~100 ms

Worst Path: ~300 ms

Median: ~ 150 ms

Observation : Feasible paths have much varying properties

Source: *Evaluating the Benefits of the Locator/Identifier Separation.* B. Quoitin, L. Iannone, C. de Launois, O. Bonaventure. The 2nd ACM International Workshop on Mobility in the Evolving Internet Architecture (*MobiArch'07*)

How to support TE in Shim6

Shim6 must deal with TE requirements

Problem:

the hosts cannot know the entire topology

the hosts cannot analyze paths on demand

Solution:

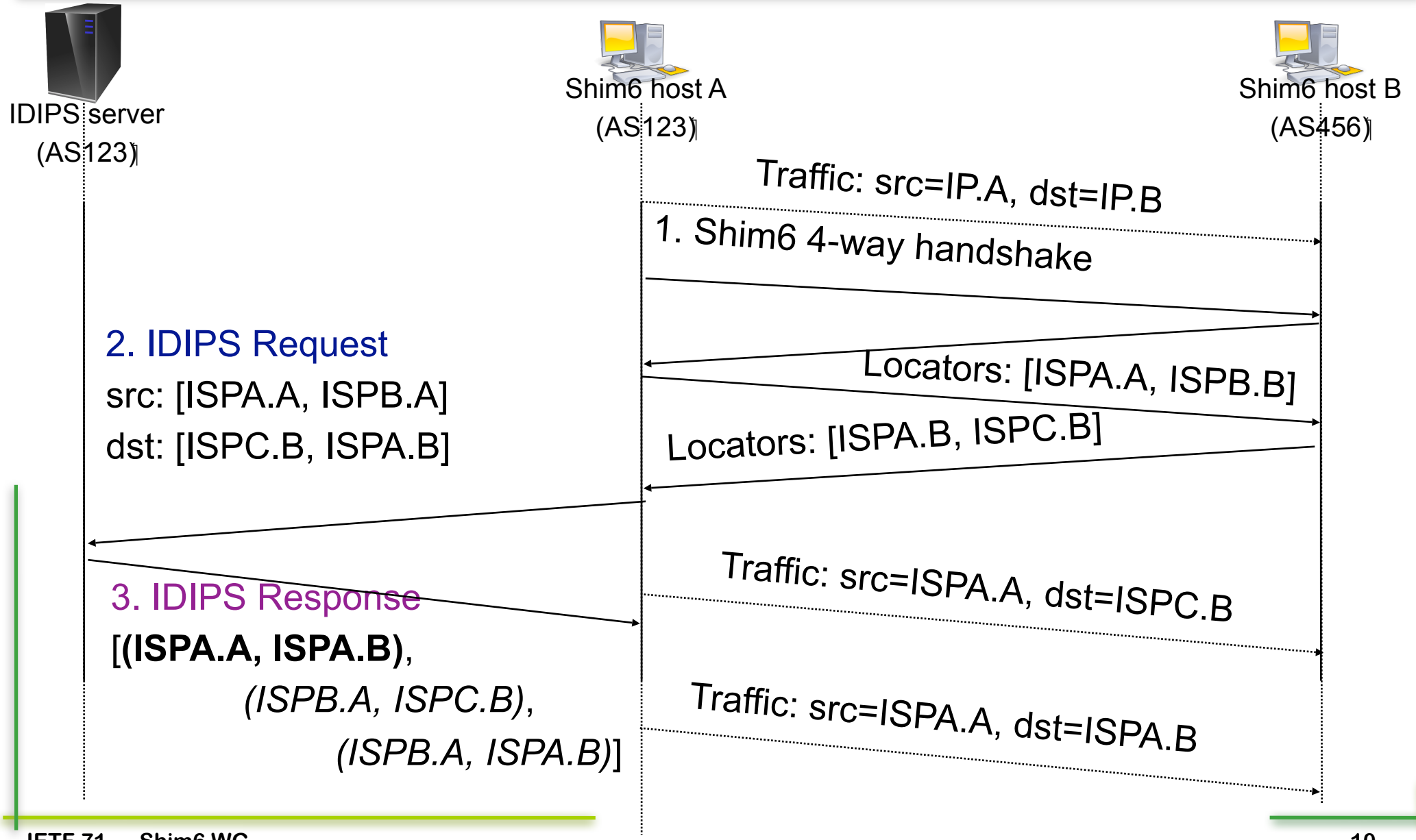
- provide an independent service that can identify the best paths
- suggest changing locators even if no failure is detected

IDIPS: ISP-Driven Informed Path Selection

Propose a paths selection service that can be queried by the hosts:

- **The client gives a list of source addresses and a list of destination addresses**
- **The server returns an ordered list of *(source,destination)* couples.**
  - **The first entries in the ordered list are the more profitable**
  - **The list may not contain all the possible couples.**
- **IDIPS allows definition of complex preferences**

IDIPS with Shim6



IDIPS with P-Shim6

P-Shim6 can ensure TE in multihomed networks

How to dynamically manage TE in P-Shim6?

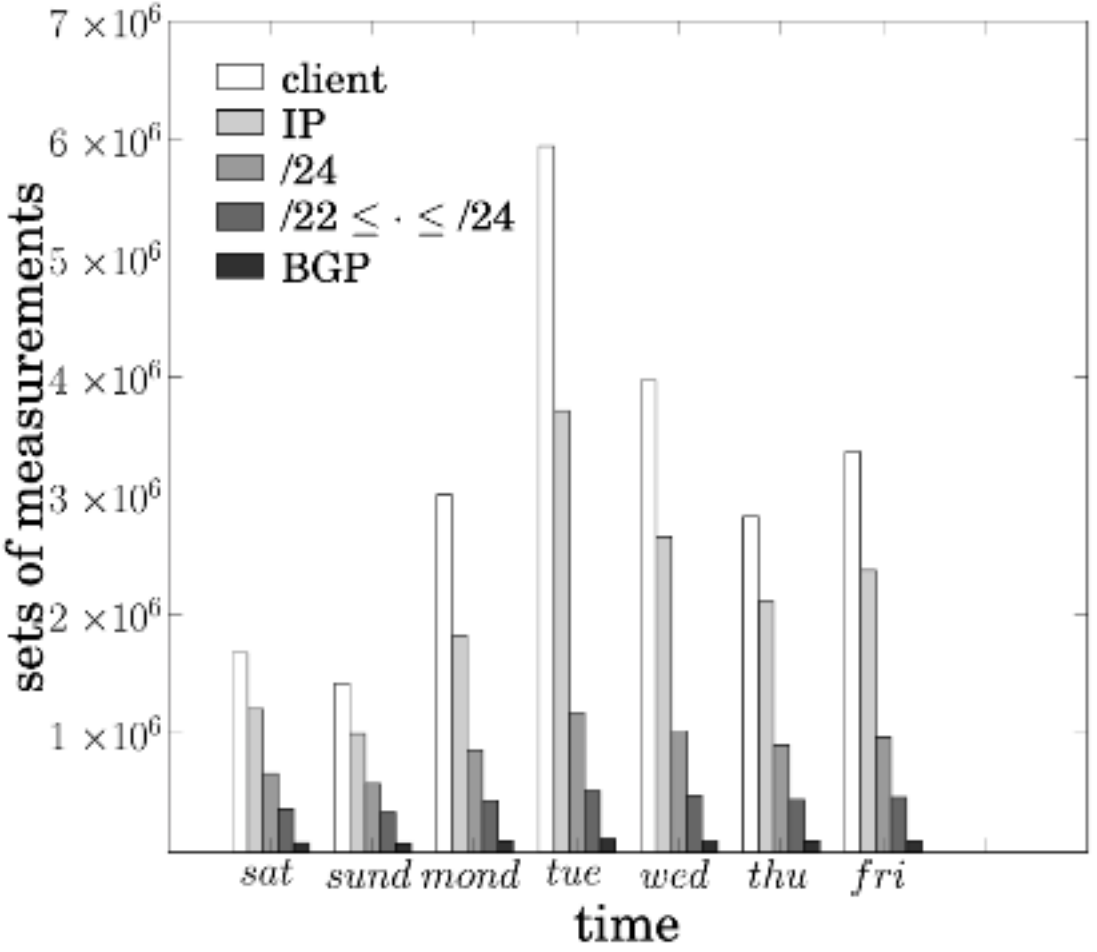
Use IDIPS as the TE part of P-Shim6

Conclusion

- Multihomed site have TE requirements
- Combine Shim6 with a path selection service to ensure TE
- IDIPS unifies the decision between the AS and the hosts: The AS can optimize the resources consumption

- Is there interest from enterprise networks / ISPs ? (Feedback Needed!!!)

Backup 1


client
IP
/24
/22 ≤ · ≤ /24
BGP
sets of measurements
7 ×10^6
6 ×10^6
5 ×10^6
4 ×10^6
3 ×10^6
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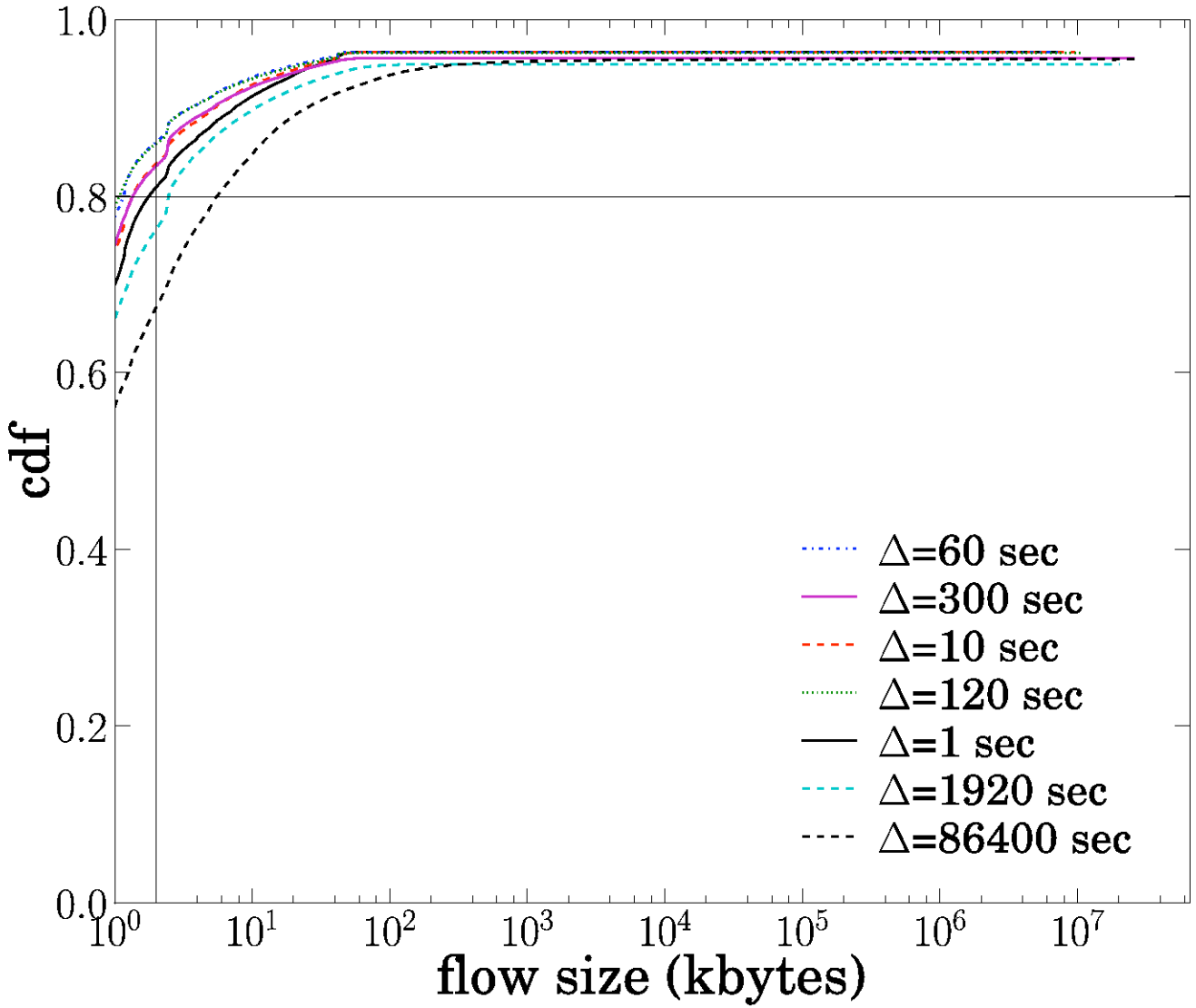
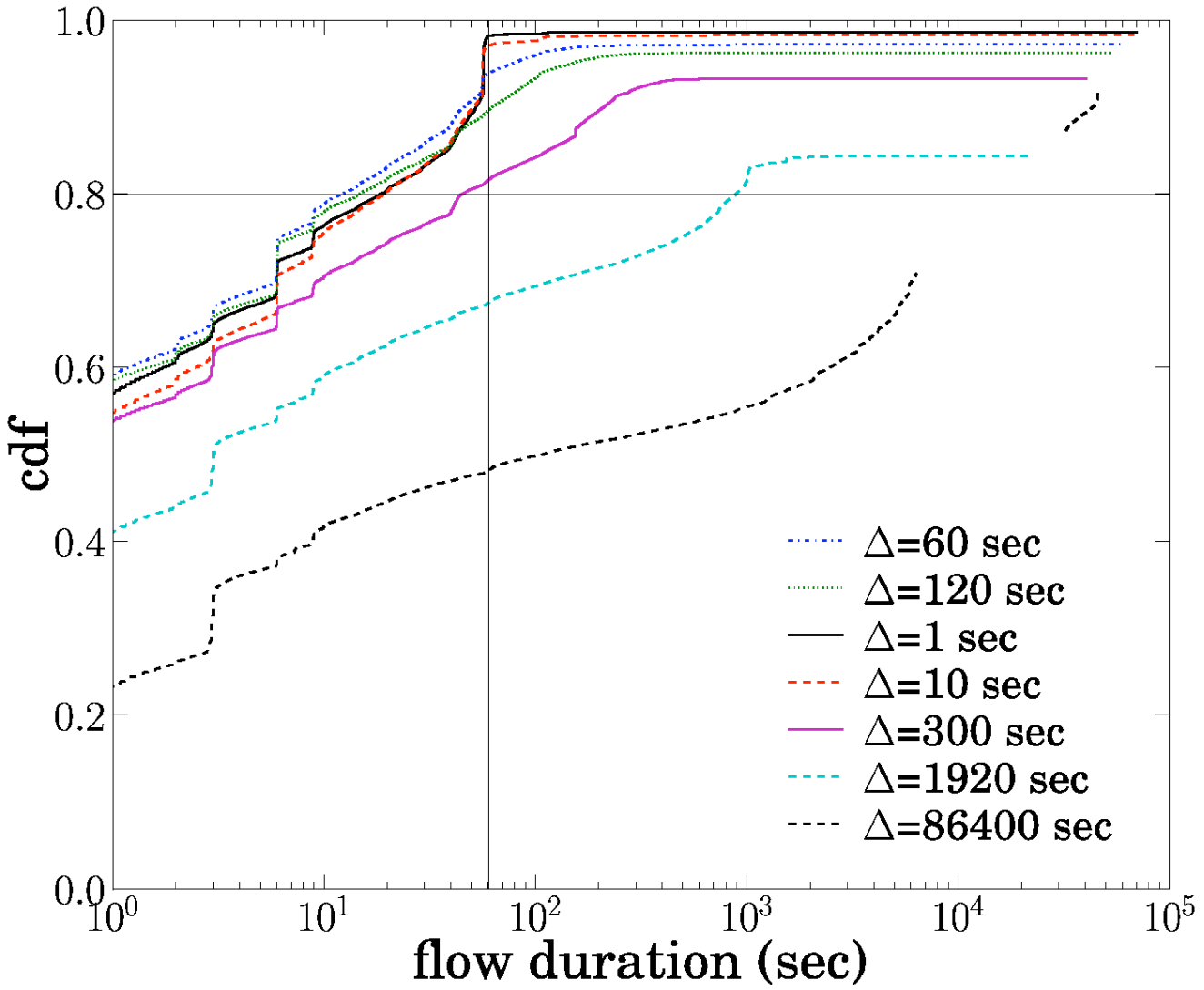
Backup 2a


1.0
0.8
0.6
0.4
0.2
0.0
cdf
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7
flow size (kbytes)
Δ=60 sec
Δ=300 sec
Δ=10 sec
Δ=120 sec
Δ=1 sec
Δ=1920 sec
Δ=86400 sec

Backup 2b


1.0
0.8
0.6
0.4
0.2
0.0
cdf
10^0
10^1
10^2
10^3
10^4
10^5
flow duration (sec)
Δ=60 sec
Δ=120 sec
Δ=1 sec
Δ=10 sec
Δ=300 sec
Δ=1920 sec
Δ=86400 sec