



salzburgresearch



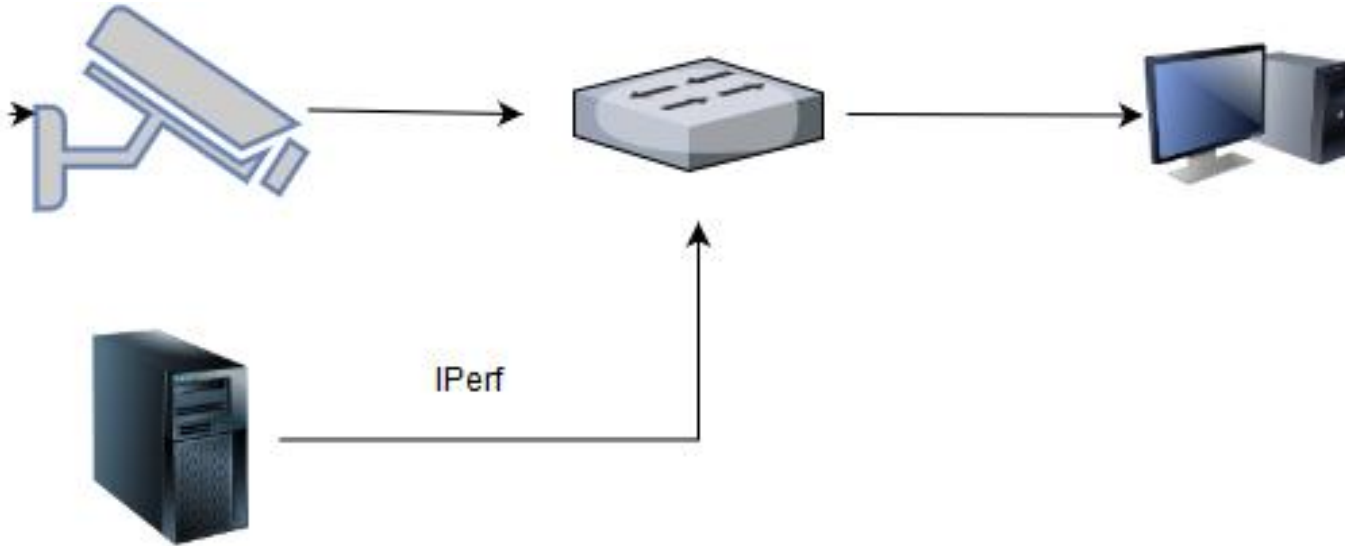
COPADATA
do it your way



Dynamic Content Adaptation for Timely Delivery of Critical Data under Network Congestion

Jia L. Du, Stefan Linecker, Reinhard Mayr
12th Int. Conf. on Emerging Networks and Systems Intelligence
(EMERGING 2020)
October 25-29, 2020
Nice, France

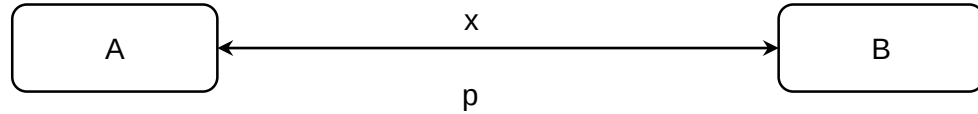
TriCePS Adaptation Mechanism: Content (Type) Adaptation



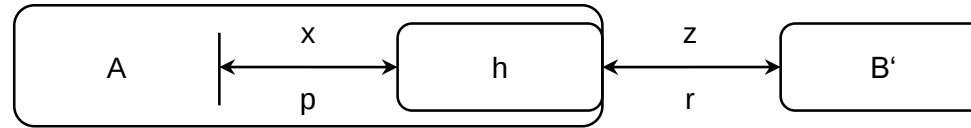
The sheep jumped!

- Self-adapt the content (type) to network conditions (going beyond HTTP Adaptive Streaming)
- Scale bandwidth demand by a factor of 1000
- Receive most important data in time, even in case of congestion

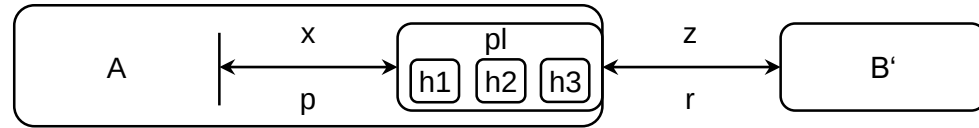
Two applications (A, B)



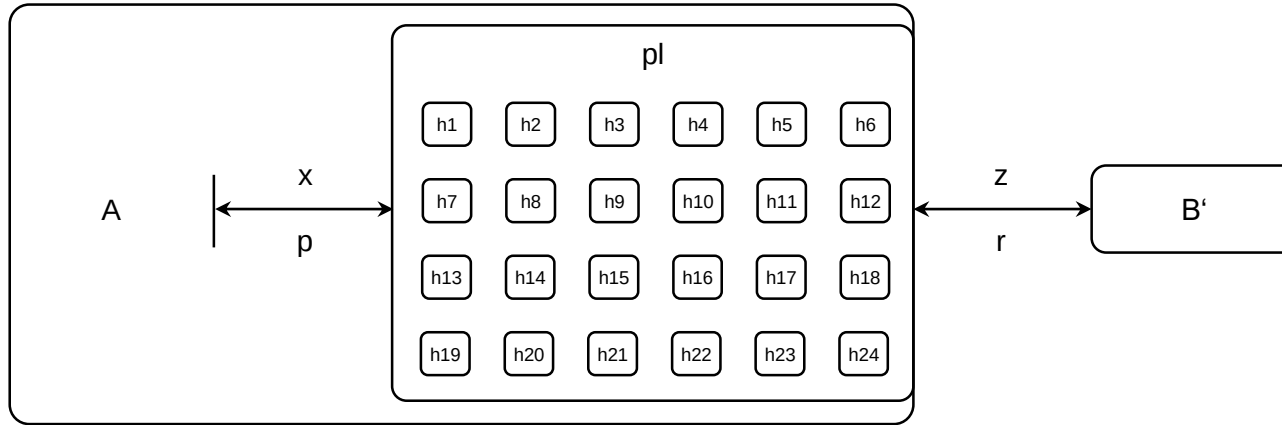
Two applications (A, B), A has an embodied handler h



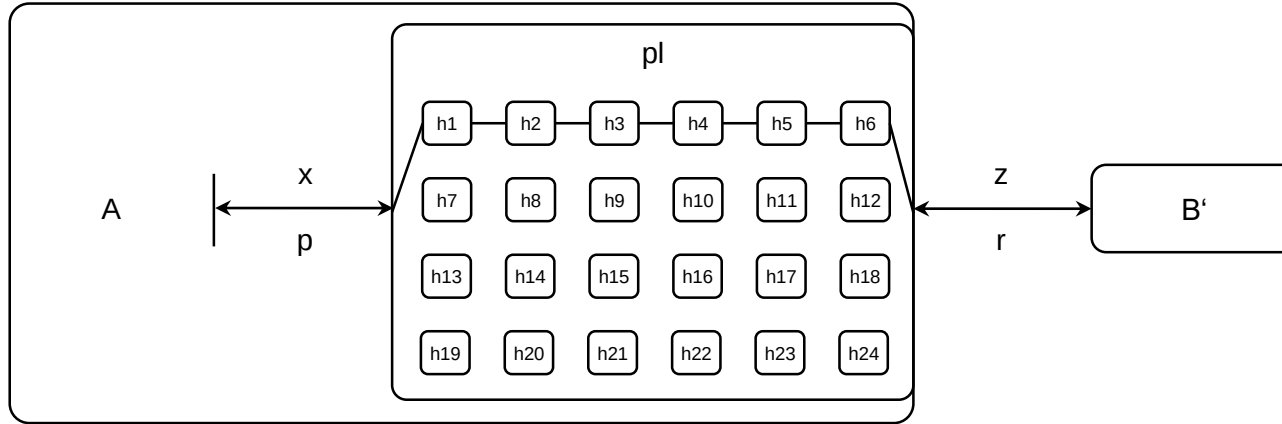
A pipeline of handlers



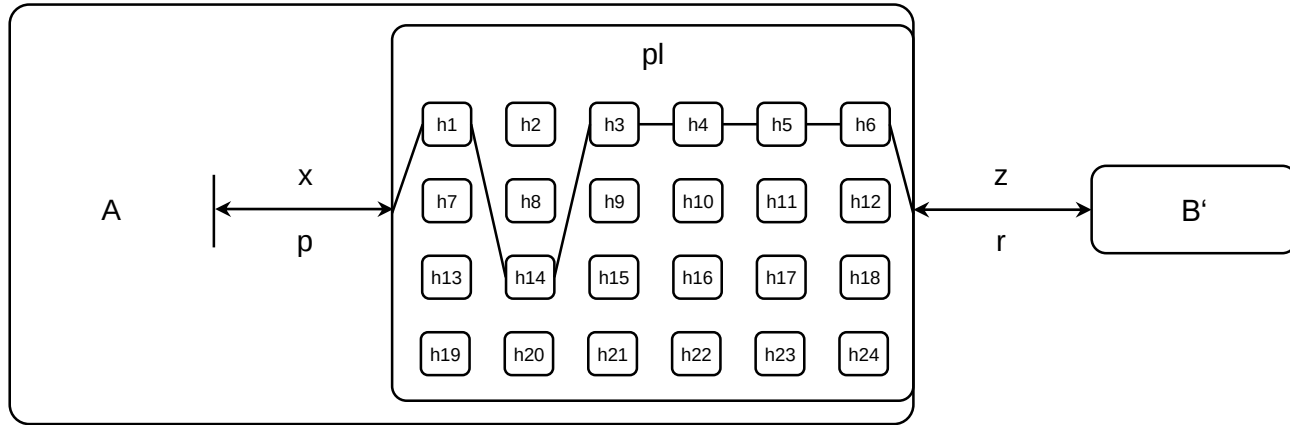
Those handlers are very lightweight



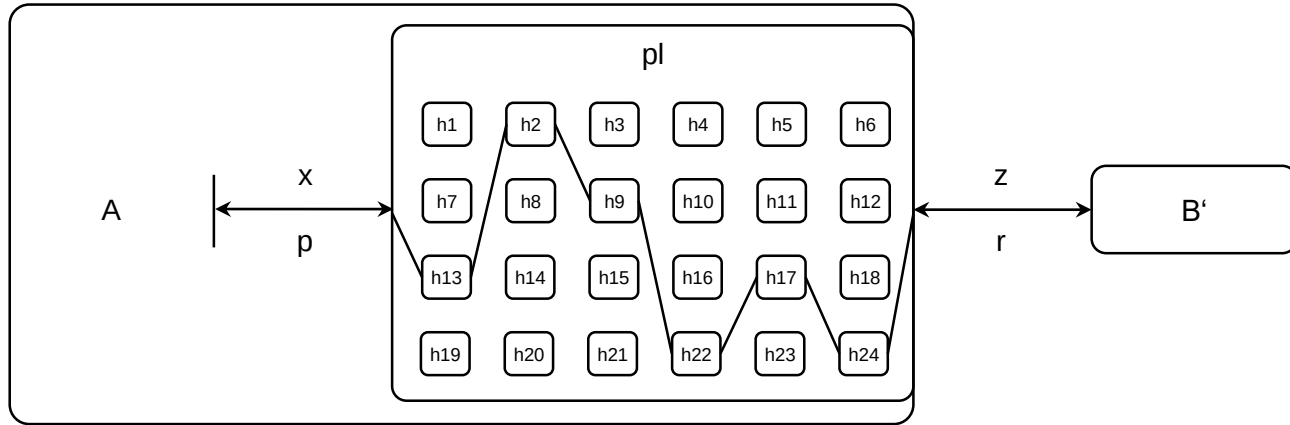
Pipeline configuration = ordered set of active handlers



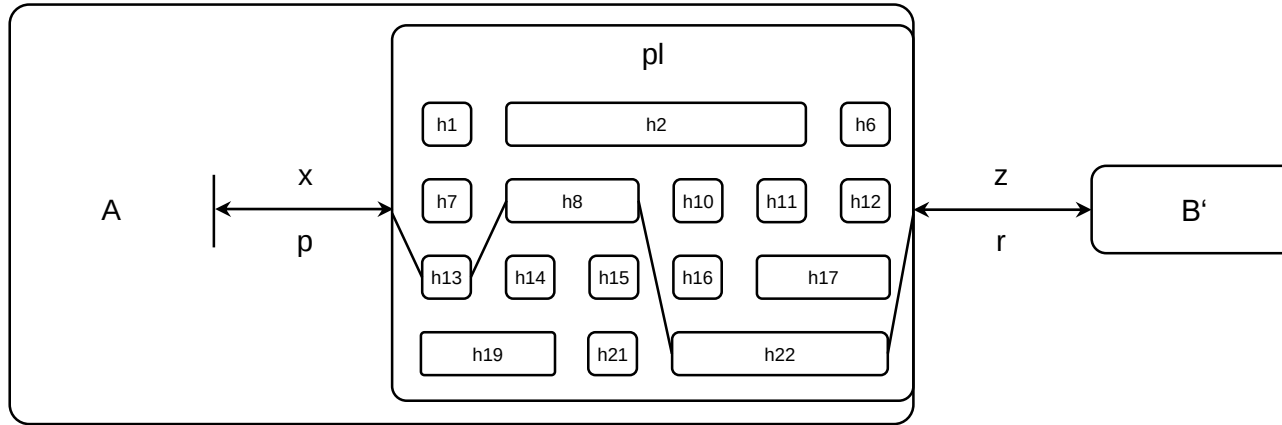
Instant (=ms) reconfiguration



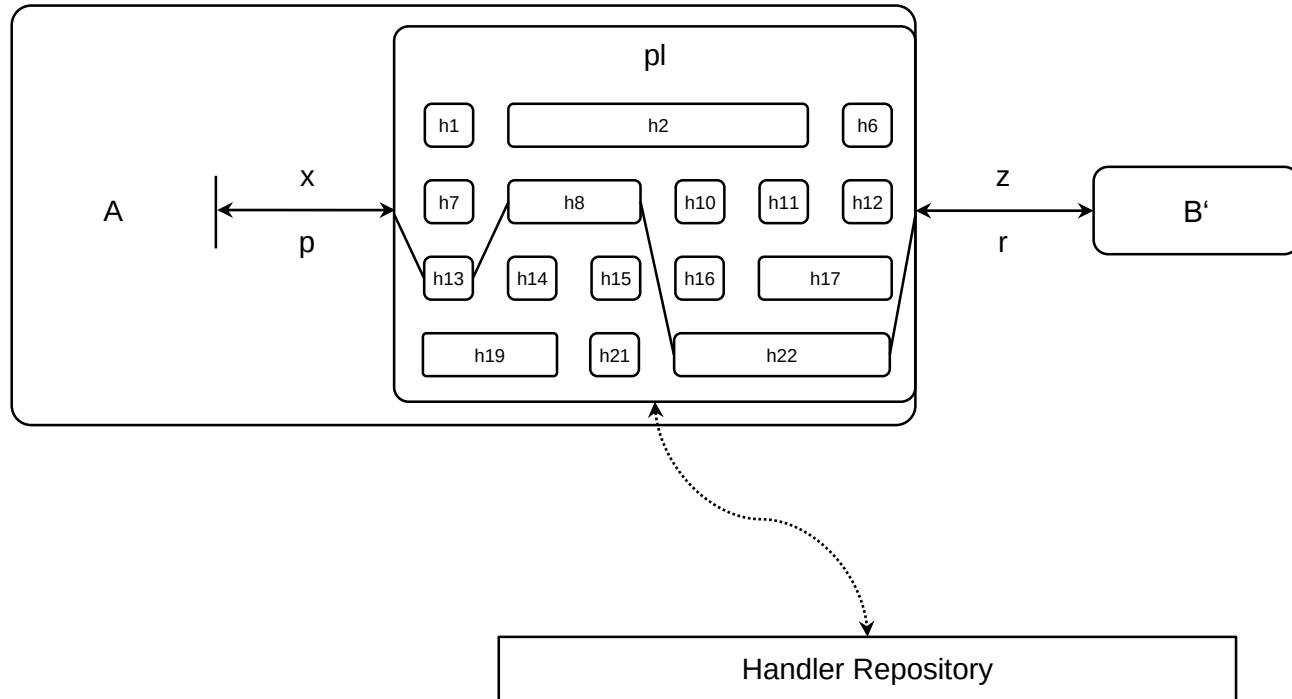
Multi-Reconfiguration



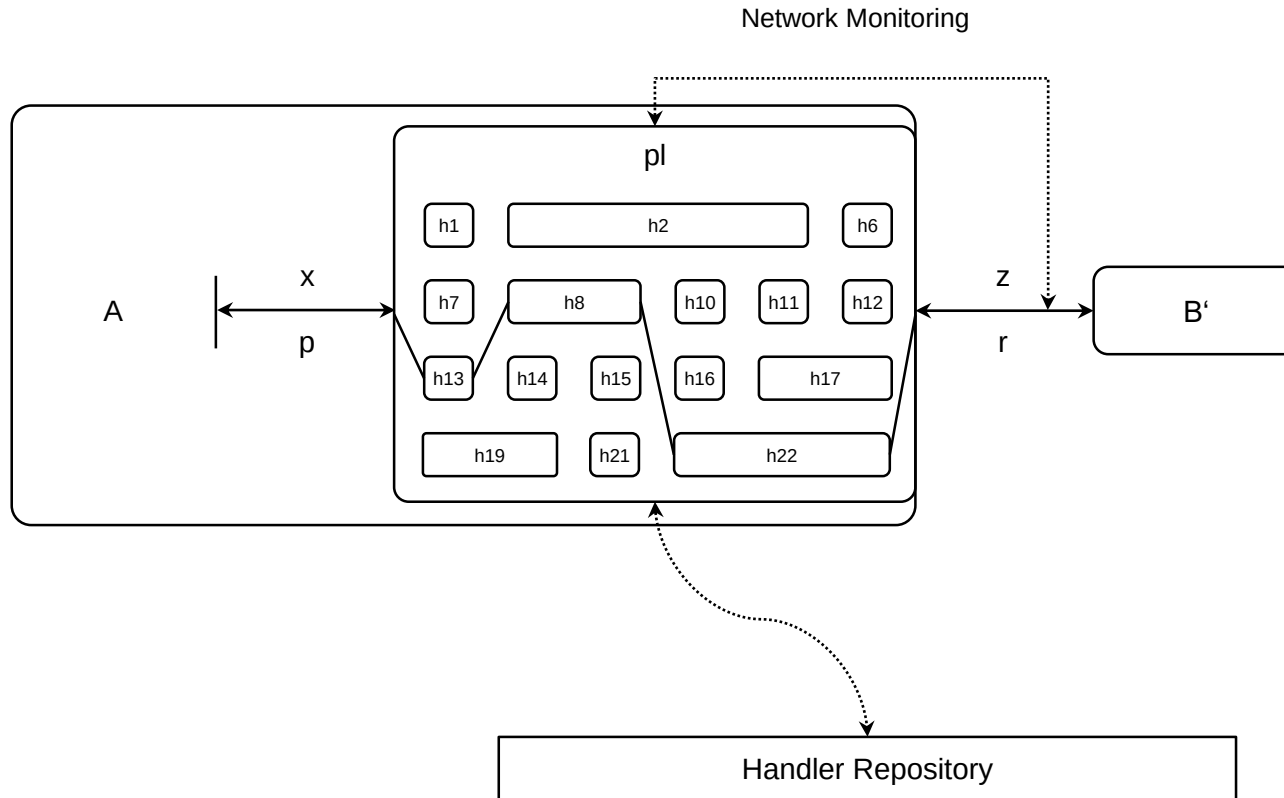
Handler granularity is modular



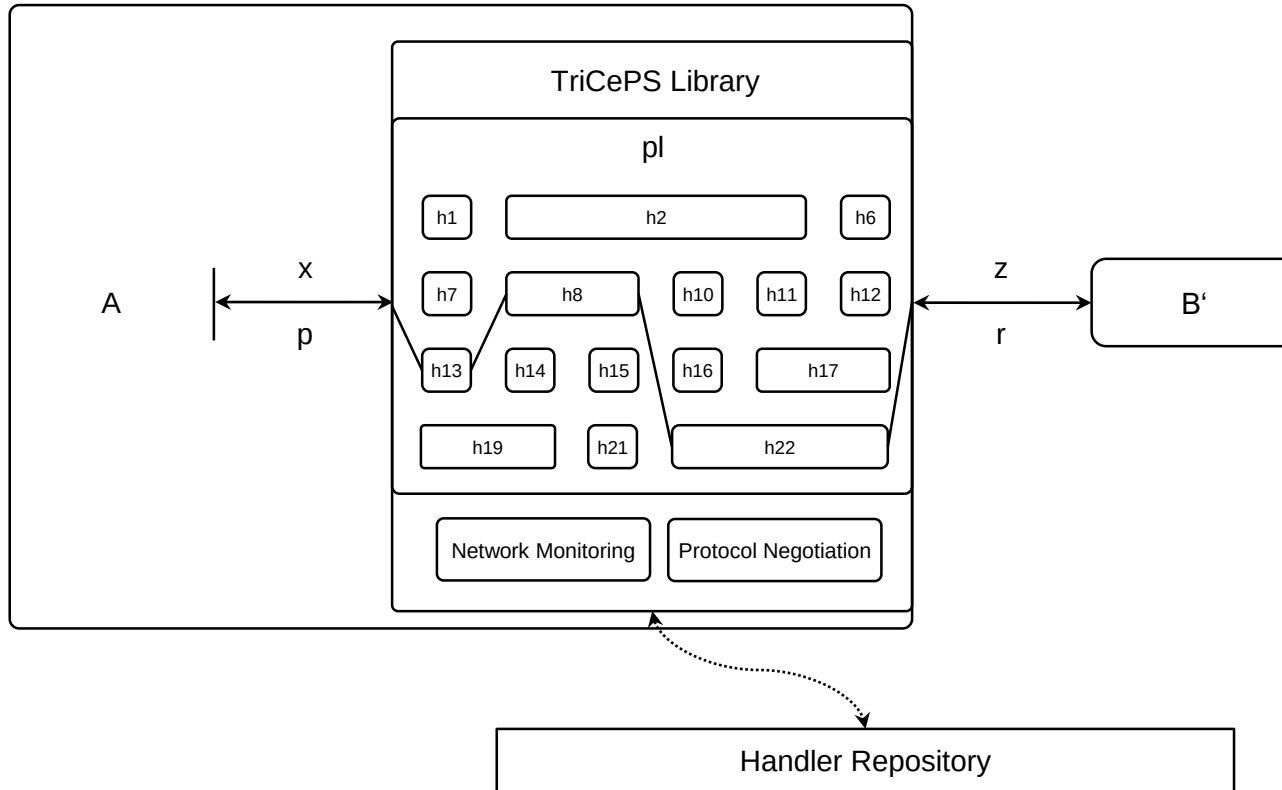
Adding new handlers



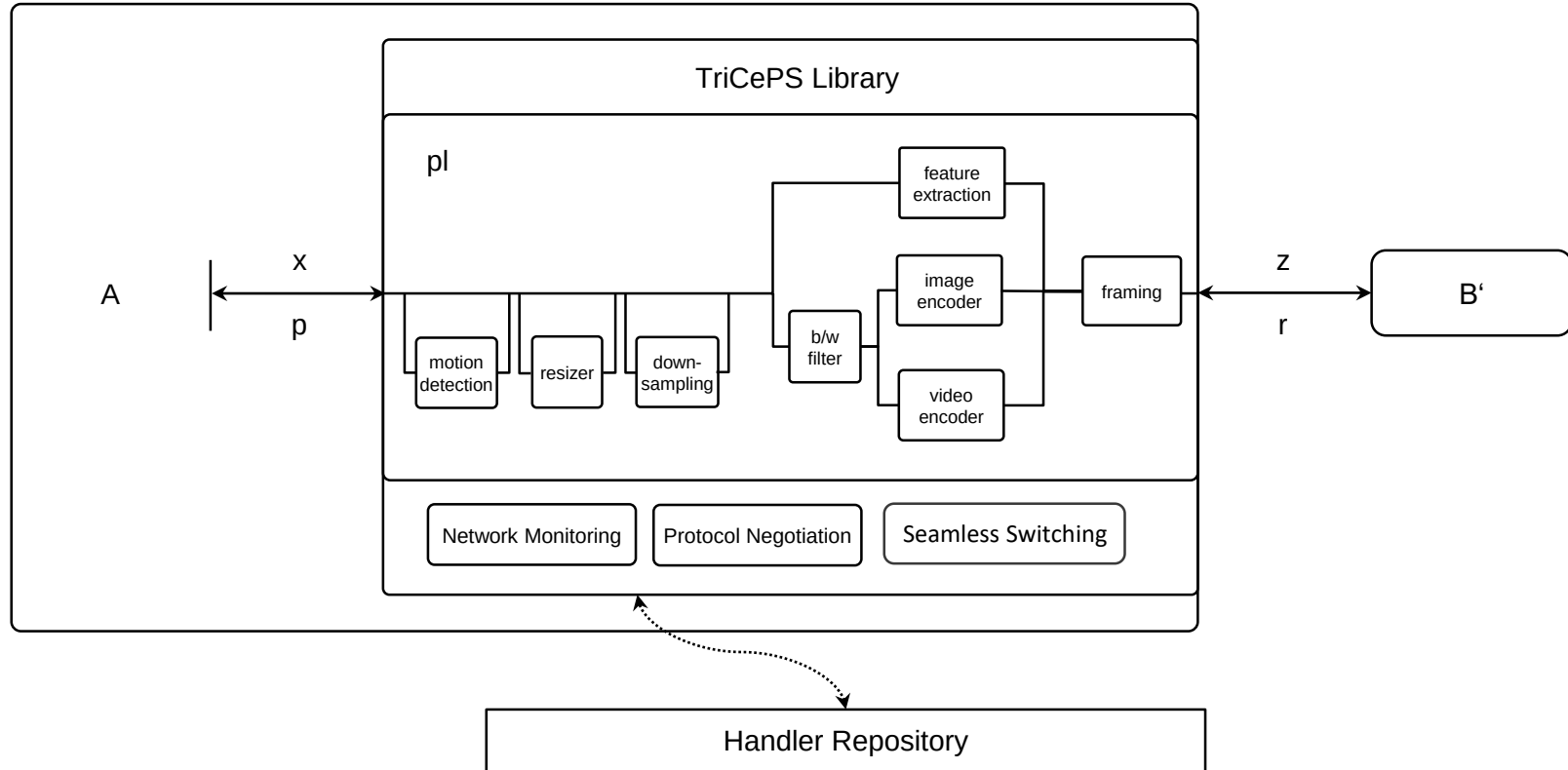
When to switch handlers?



TriCePS Architecture: Almost There

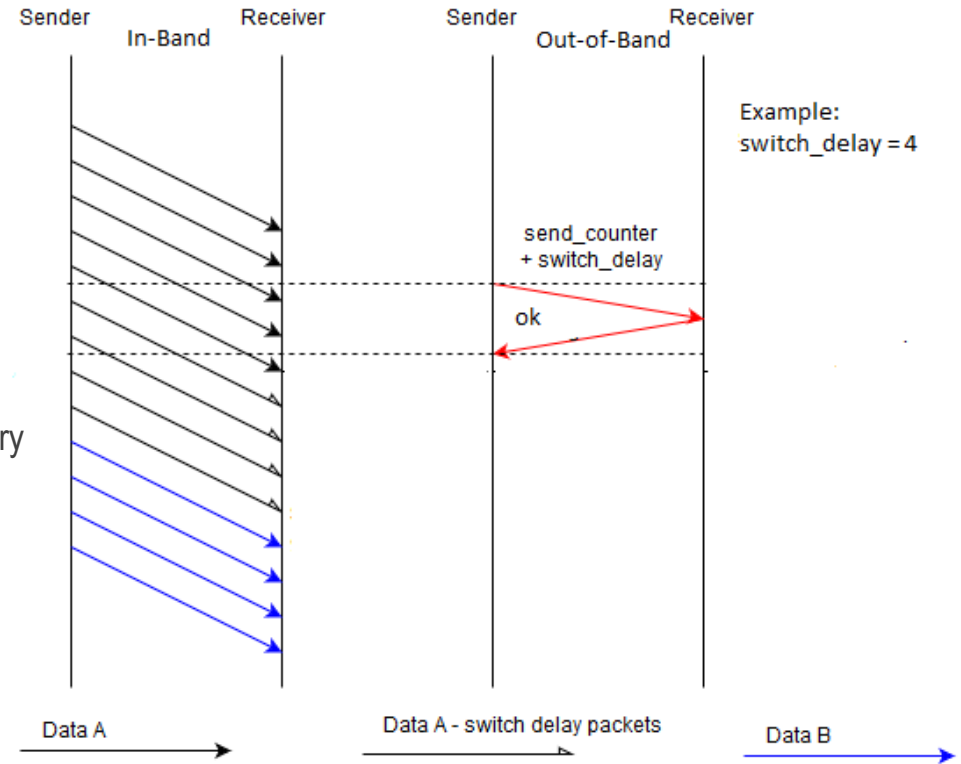


Surveillance Camera Example

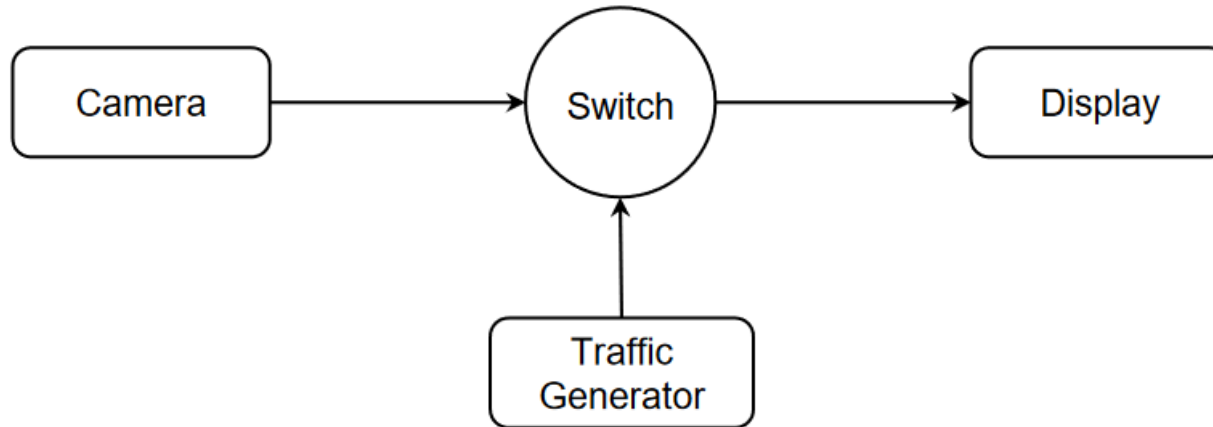


Simple, Exchangeable Components

- Network Monitoring
 - RTT, send buffer, FPS, ...
- Protocol Negotiation
 - List of protocols sorted by priority
- Protocol repository
 - Local repository cache, remote global repository
- Seamless switching
 - Out-of-band example to the right
- Pipeline
 - CV2



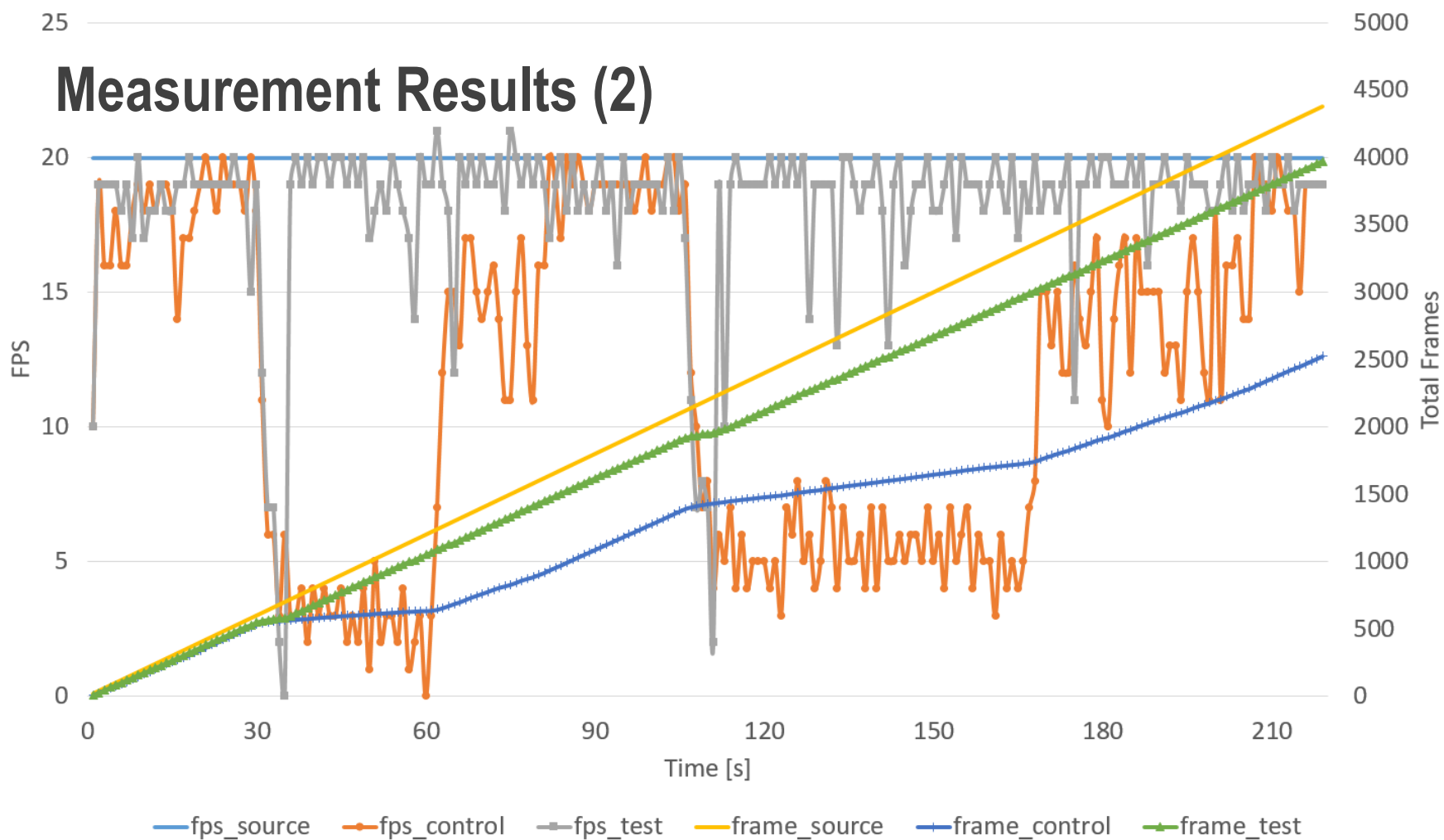
Test Setup



Measurement Results (1)

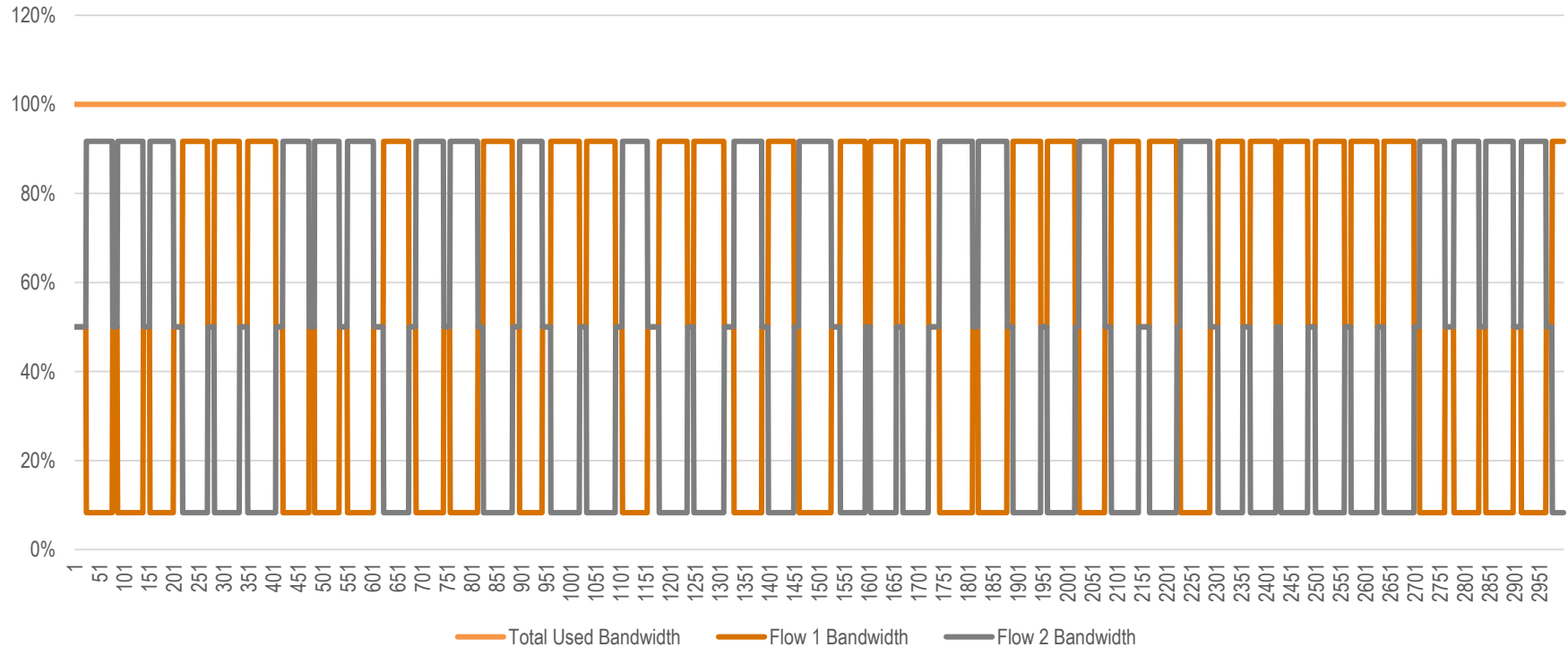
	Without TriCePS	Using TriCePS	Difference
Frames sent in test period	2566 (72)	3995 (34)	56%
Average frame delay	871 ms (146 ms)	108 ms (12 ms)	-88 %
Average RTT	53 ms (4.5 ms)	33 ms (2.4 ms)	-38 %

Measurement Results (2)



Fairness Between TriCePS Flows (1)

2 Flows Competition Simulation



Fairness Between TriCePS Flows (2)

# of Flows	Fair Share of Total BW	Min. Share	Max. Share
2	50 %	47.3 %	52.6 %
4	25 %	22.3 %	25 %
8	12.5 %	11.2 %	13.4 %
20	5 %	4.16 %	5.43 %

Demo



Video Material Source:

S. Oh, A. Hoogs, A. P. et al., "A large-scale benchmark dataset for event recognition in surveillance video," in Proc. of IEEE Computer Vision and Pattern Recognition (CVPR), 2011

Demo

High quality color images

Individual Sample Image



Frames representing one second of playback (@ 1 fps)



Bandwidth requirements: ~ 20%

Demo

Rectangular overlays for moving persons and objects

Individual Sample Image



Frames representing one second of playback (@ 10 fps)



Bandwidth requirements: < 1%

Summary

- Prioritization through Content Adaptation
- Architectural concept with reference implementation
- Future work: what is important data? When to switch to what?



salzburgresearch



Q&A

Jia Du, Stefan Linecker



Salzburg Research Forschungsgesellschaft m.b.H.
Jakob-Haringer-Straße 5/3 | Salzburg, Austria



+43/662/2288-446



{Jia.du, stefan.linecker}@salzburgresearch.at

