



Trilogy

Architecting the Future Internet



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MANA Panel 2: FI - Networking Architectures - Horizontal Topics

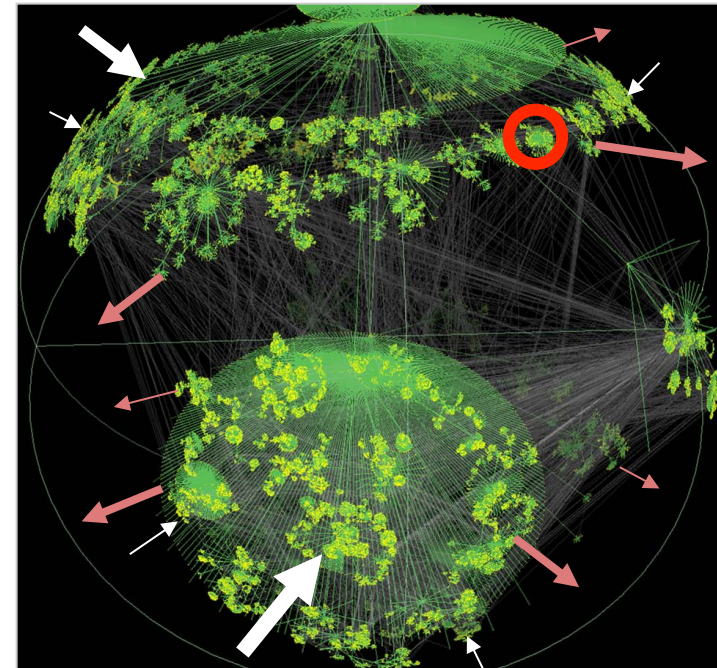
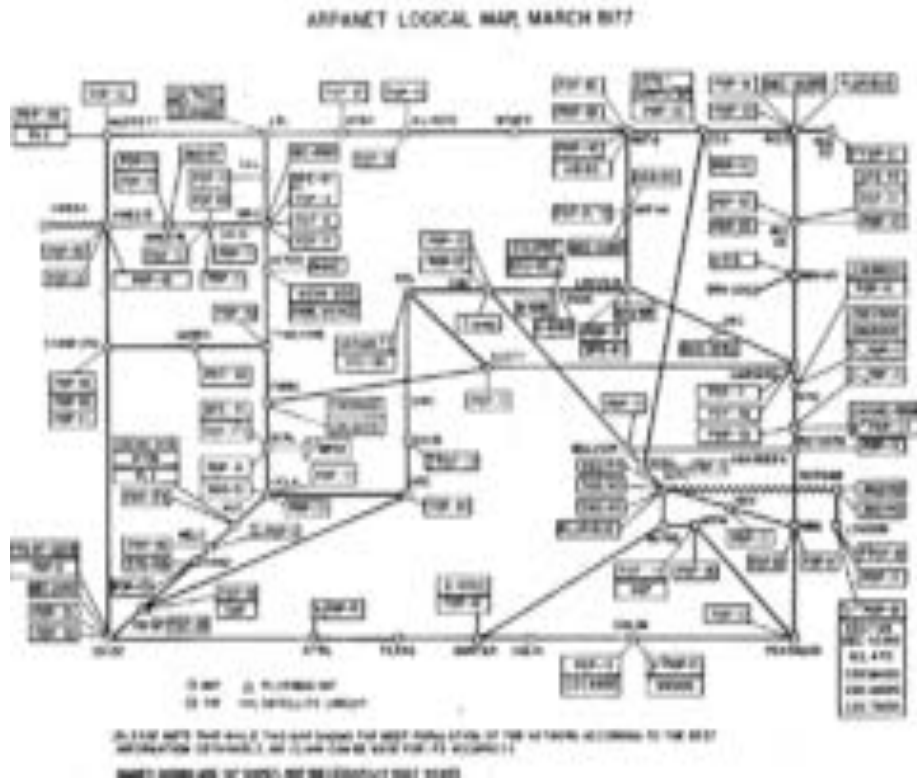
Expected Outcome of the Panel 2: Proposals & priorities for interdisciplinary research directions as part of Future Internet research agenda



- 1. What are the main bottlenecks in the current Internet? What are the first 3-5 key challenges/problems to be fixed? What can we learn from the last 40 years of evolution Internet; what should be avoided
- 4. Better & different support of services/applications
- 5. Trust and privacy is crucial - how to provide trust models; how to design network elements/components which can be trusted?
- 6. How to test new functions? How to deploy novel features? Economic viable solution for changing networking systems?
- 7. How to interwork Future Internet with Current Internet? Parallel Internets
- 8. New Transport / New forwarding capability / programmability of the forwarding plane /programmability of the control plane
- 9. More or less intelligence in the networks
- 11. Information centric networks Vs connectivity networks
- 12. Virtualization of Networks
- 10. How to design energy efficient Networking Systems



No clean slate needed!



for scale: ~10M lines ringed in red

Internet topology visualization produced by Wairus
(Courtesy of Young Hyun, [CAIDA](#))

Internet is not (just) about distributed computing systems

- But *economics*
 - Mirror of society & commerce
 - On-going contention (tussle) amongst parties over economic & social reward, power etc
- Internet world – allow tussle at *run time*
 - Things change faster on Internet
 - Business models (value chain, actor-network) fluid
- So engineering design should reflect this: “design the playing field not the outcome”, “tussle at run time” (ie whilst the system is in use)

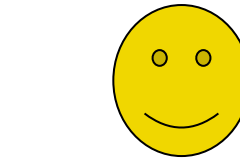
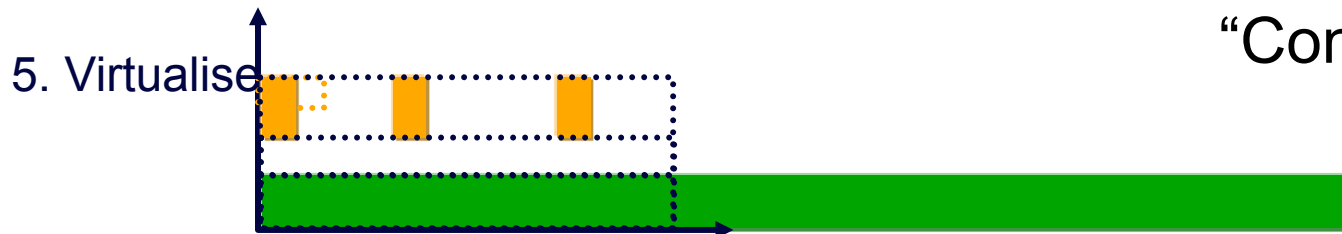
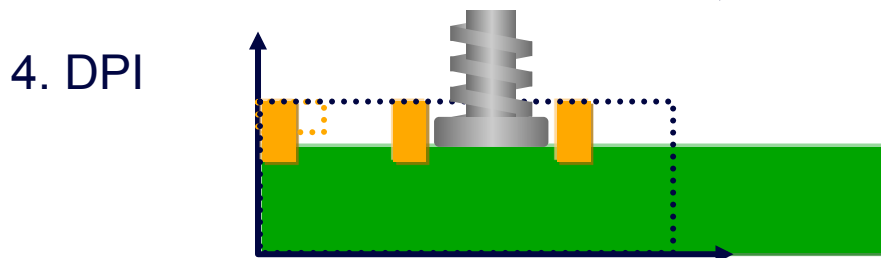
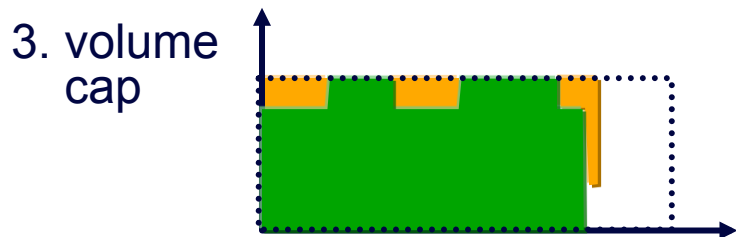
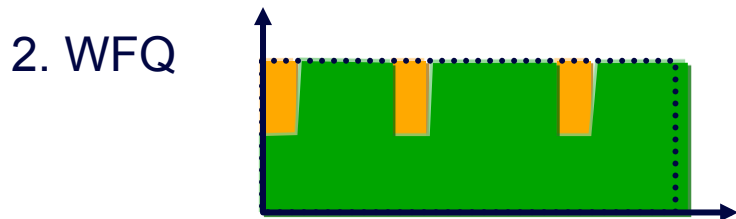
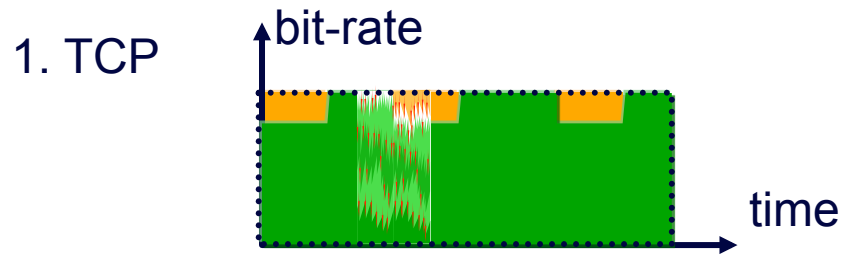


Resource pooling

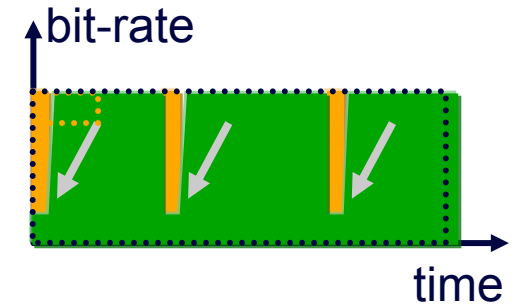
– key reason for Internet's success



How to share the resource pool?



weighted sharing



- (want) End-system flexibility
- (needs) Accountability for network usage (scarcity)
 - If no-one else using link, then usage cost is zero
- (technology to do it)
“Congestion transparency”



Priorities for FI Research

- Deployability
- Assume that parties are competitive (commercially, utility...)
 - Inter-domain vs intra-domain
 - Accountability for network usage
 - (for forwarding pkts)
- Resource pooling is beautiful,
 - how to stay beautiful?
 - Don't cheese slice!
 - Congestion transparency to get accountability for network usage
 - Test, standards, innovations...
 - Resource pooling beyond usage for pkt forwarding?



Trilogy – An Architecture for Change

Scope

- Crudely: “Control” for “The Internet” : Internet hourglass at the control layer
- Reachability & resource control (& their integration)

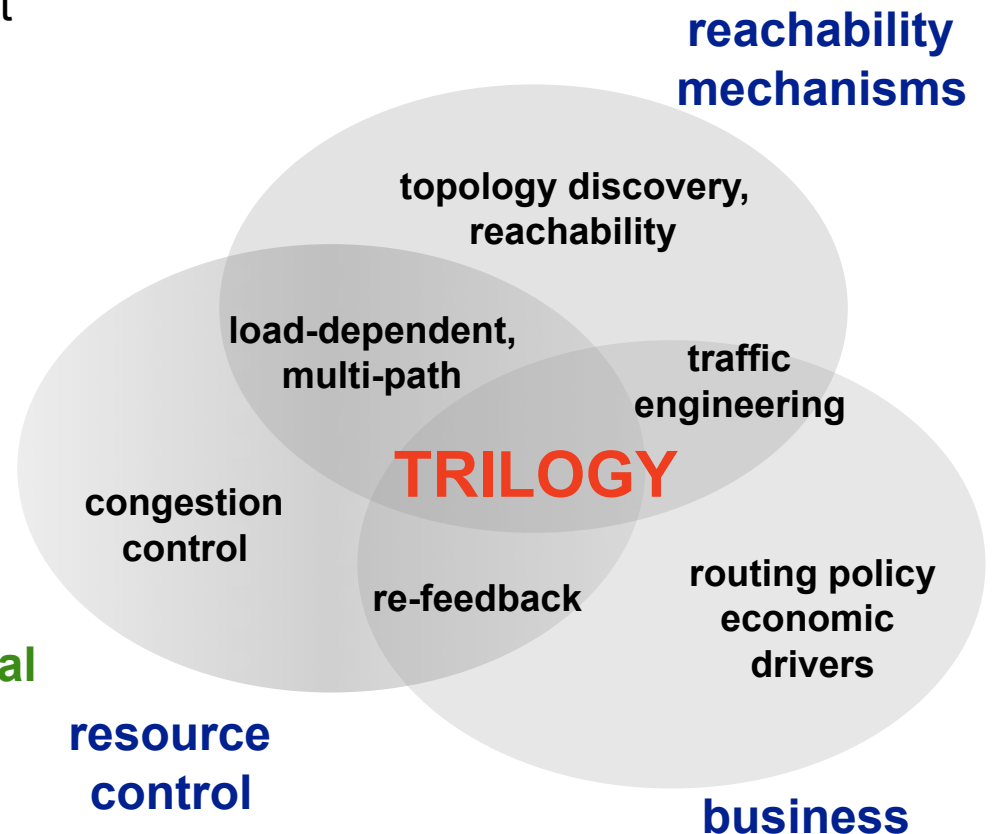
Approach

- Economics & Design for Tussle are central
- Revolution then evolution

Objectives

- Develop a **unified control architecture** for the Future Internet that can **adapt** in a scalable, dynamic and robust manner **to local operational and business requirements**
- Develop and evaluate **new technical solutions for: reachability & resource control**
- Assess **commercial & social control**

Trilogy Concept



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Ack

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