Overlays Can Do Everything... If Not More

(compliments to Jörg Liebeherr)

Lars Eggert

Workshop on Overlay and Network Virtualization

16th GI/ITG Conference on Kommunikation in Verteilten Systemen
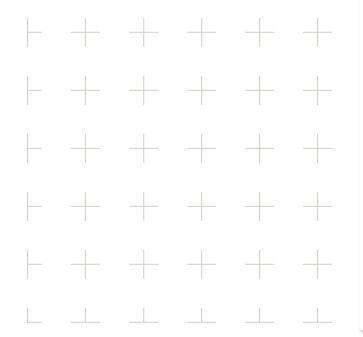
Kassel, Germany

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Disclaimer

these may or may not be my personal opinions (it's a panel...)

these are definitely <u>not</u> Nokia positions

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Overlays can do everything...

you get your own network with whatever characteristics you like

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...and more!

everyone gets their own network with whatever **different characteristics or architecture** they like

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Serious Slide #1

just how many different architectures are we planning on having?
  (for the long run, i.e.. not for research)

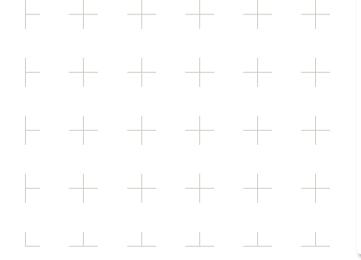we're struggling to scale even one – the Internet

which is for the foreseeable future also **the substrate**

i.e., the thing that limits how good a virtualized architecture can be

Internet?

Internet paths and protocols don't have the characteristics my application needs or prefers
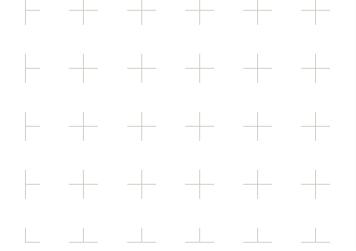
Overlays!

overlays give my app the breathing room and environment it wants

on top of the unsuitable Internet substrate

But, Lars, how?

apply CS 101

layering + indirection

layering = encapsulation

indirection = custom routing/fwd'ing

Sounds great!

sending **fewer payload bytes** (encapsulation) over overlay paths with **more stretch** (custom routing) is going to enable my killer app

er, wait...

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Serious Slide #2

virtualization has some selling points
  abstraction, sharing, protection, etc.

performance is probably not one of them
  can't magically create performance that isn't in the substrate
  can't virtualize away the laws of physics
  resource reservations are (still) not the answer

virtualization can pick a different tradeoff than the substrate tough
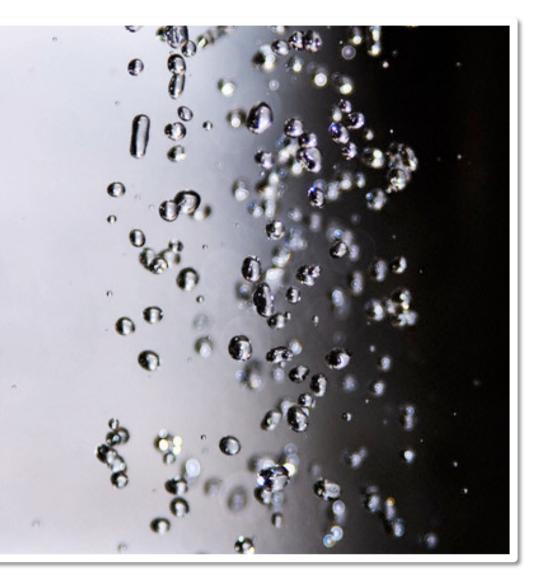 tragedy of the commons

virtualization overheads **increase** with the architectural distance
between the substrate and the architecture inside the virtual network

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I believe in trickle-down...

if my new architecture is cool enough, the substrate will grow functionality to support it more efficiently

and in the end, the virtual architecture may supplant the substrate architecture

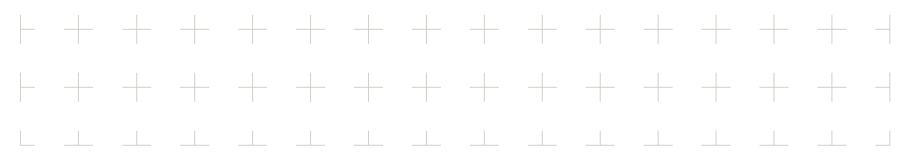
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Serious Slide #3

when has this **ever** happened?

we can barely get improvements to the Internet (substrate) deployed that are essential to extend its useful lifetime

(and those are improvements that protect the business models of the current stakeholders, which is different or at least unclear for many virtualization proposals)

no hope for more fundamental changes = have faith in Moore's law

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Chew on this

A new networking architecture will be driven by a fundamental shift in the underlying technologies, and not by incremental research.

Digital electronics paved the way for the switch from the telephone network to the Internet. A similar technological revolution will eventually obsolete the Internet.

Current technology does not support a global information network with significantly different characteristics than the Internet.

(thanks to Paul Francis & the Dagstuhl wine cellar)

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