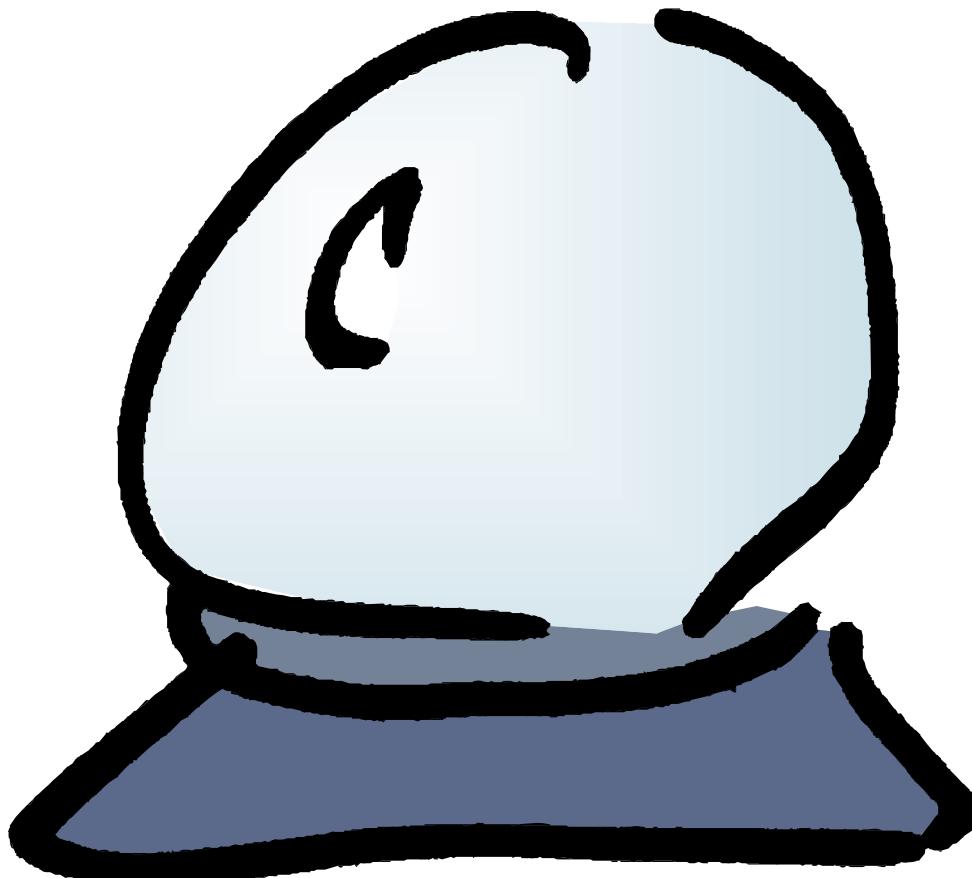
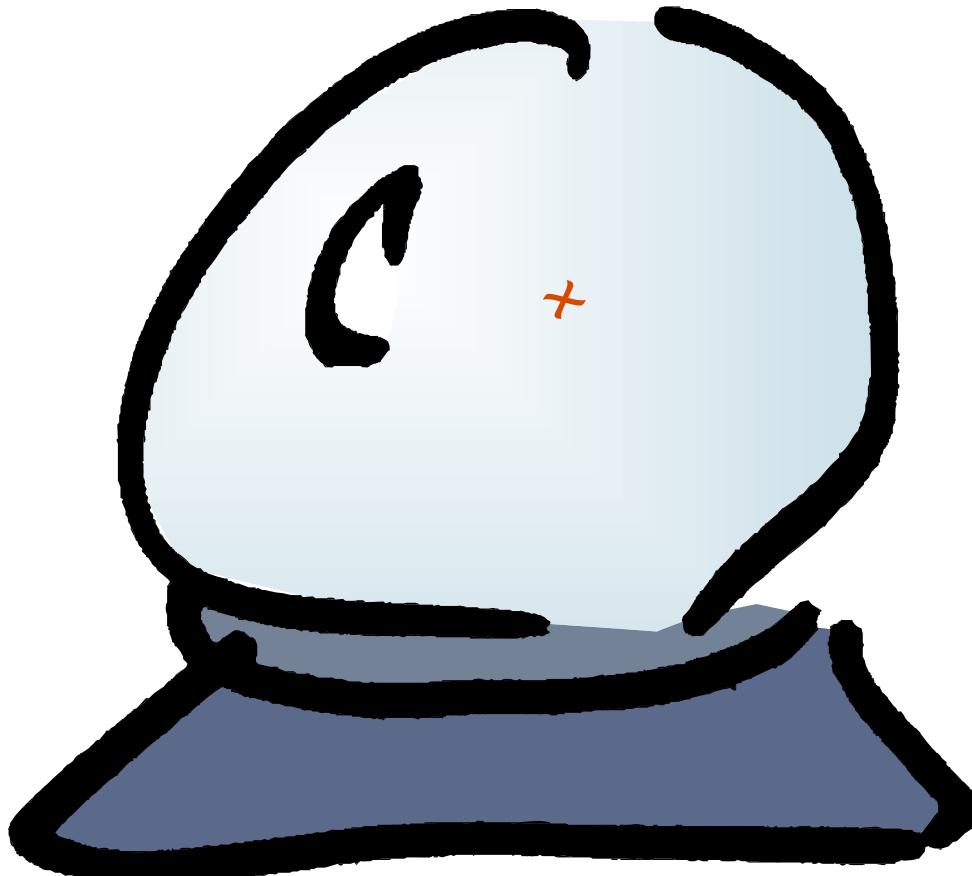


Internet Futures



My Aim:



share some thoughts
about the Internet
and its future

think about some
of the major
factors that will
shape our future

Why?

The mainstream
telecommunications
industry has a
rich history



Why?

The mainstream
telecommunications
industry has a
rich history

...of making very poor
technology guesses

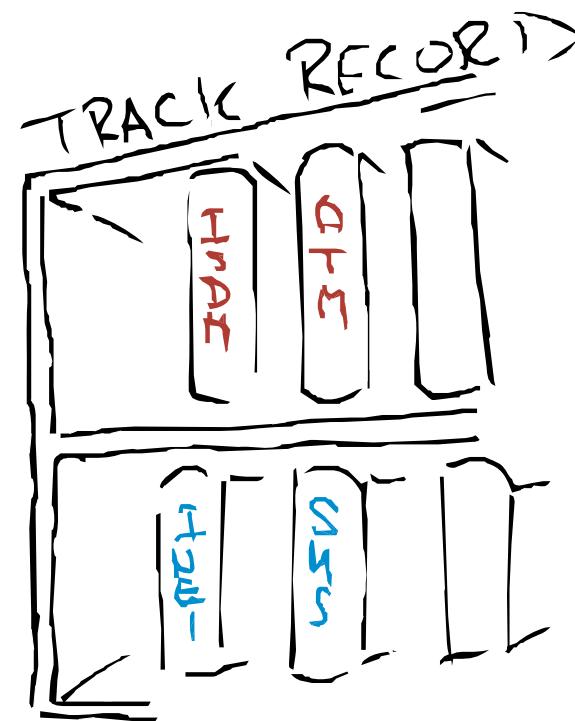


Why?

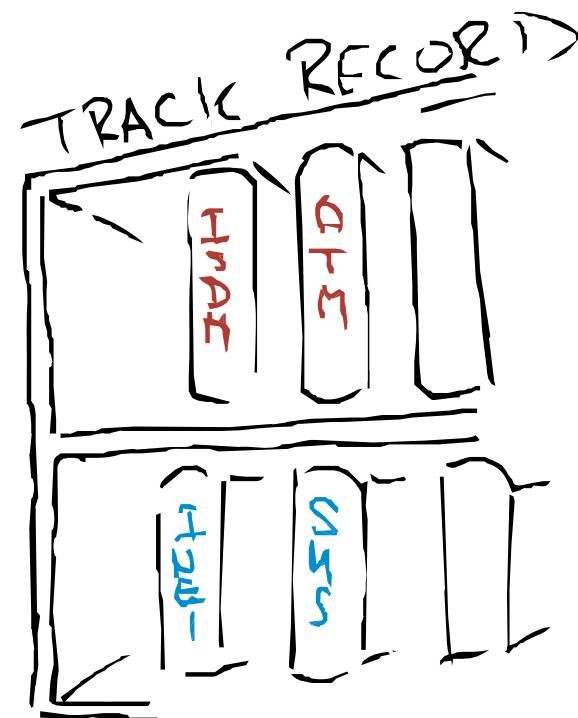
The mainstream
telecommunications
industry has a
rich history

...of making very poor
technology guesses

and regularly being
taken by
surprise!



Can the Internet
do a **better** job
of matching
technology to
user needs?



One approach:

1. Observe the situation and what's happening

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3. Understand where this may lead us and what options may be presented on the way

One approach:

1. Observe the situation and what's happening
2. Believe what we see
(the most difficult one!)
3. Understand where this may lead us and what options may be presented on the way

What's Happening Today: User Preferences and the Market for Services

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From radio to tv to ?

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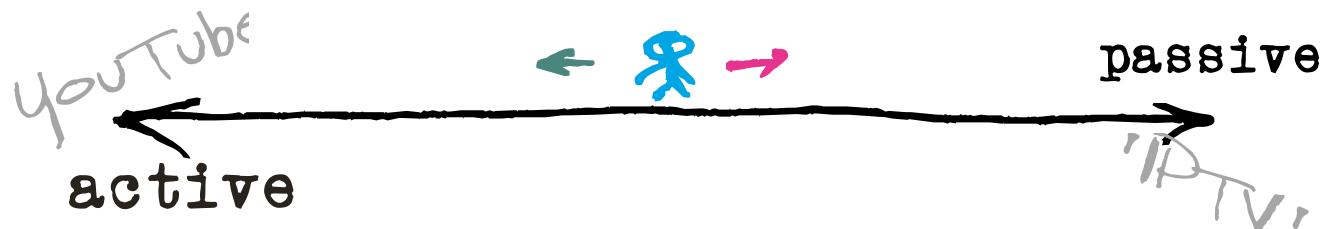
From radio to tv to ?



What's Happening Today: User Preferences and the Market for Services

From telephony to chat
to mashups to p2p to ?

From radio to tv to ?



Service Profile Choices

open vs walled
 garden

Service Profile Choices

open collaboration
framework

open

vs

walled
garden

Bundled services

Service Profile Choices

open collaboration
framework

open vs walled garden
Bundled services

open delivery infrastructure vs Service / content distribution networks

Service Profile Choices

open collaboration
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Bundled services

role
specialization

open delivery
infrastructure

vs

Service / content
distribution networks

Vertical
integration

Service Profile Choices

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Bundled services

role
specialization

open delivery
infrastructure

vs

Service / content
distribution networks

Vertical
integration

user
produced

vs

externally
produced

Service Profile Choices

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Bundled services

role
specialization

open delivery
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vs

Service / content
distribution networks

Vertical
integration

Active user
networks

user
produced

vs

externally
produced

Passive users

What's Happening Today: User Preferences and the Market for Services

From telephony to chat
to mashups to p2p to ?

From radio to tv to ?



Today's users have already clearly demonstrated their preference for an active service profile based on sharing

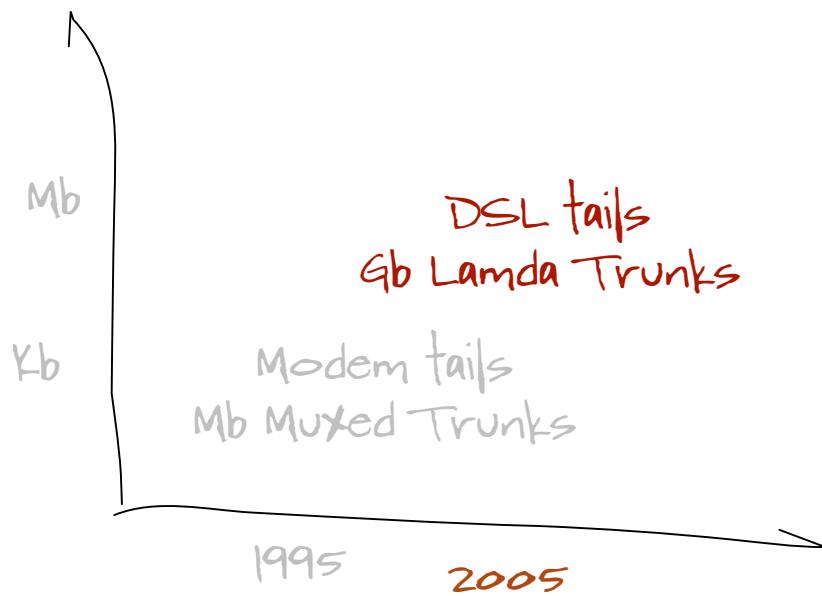
What's Happening Today: Demand for Bandwidth

what mass market customers want for \$25 per month !



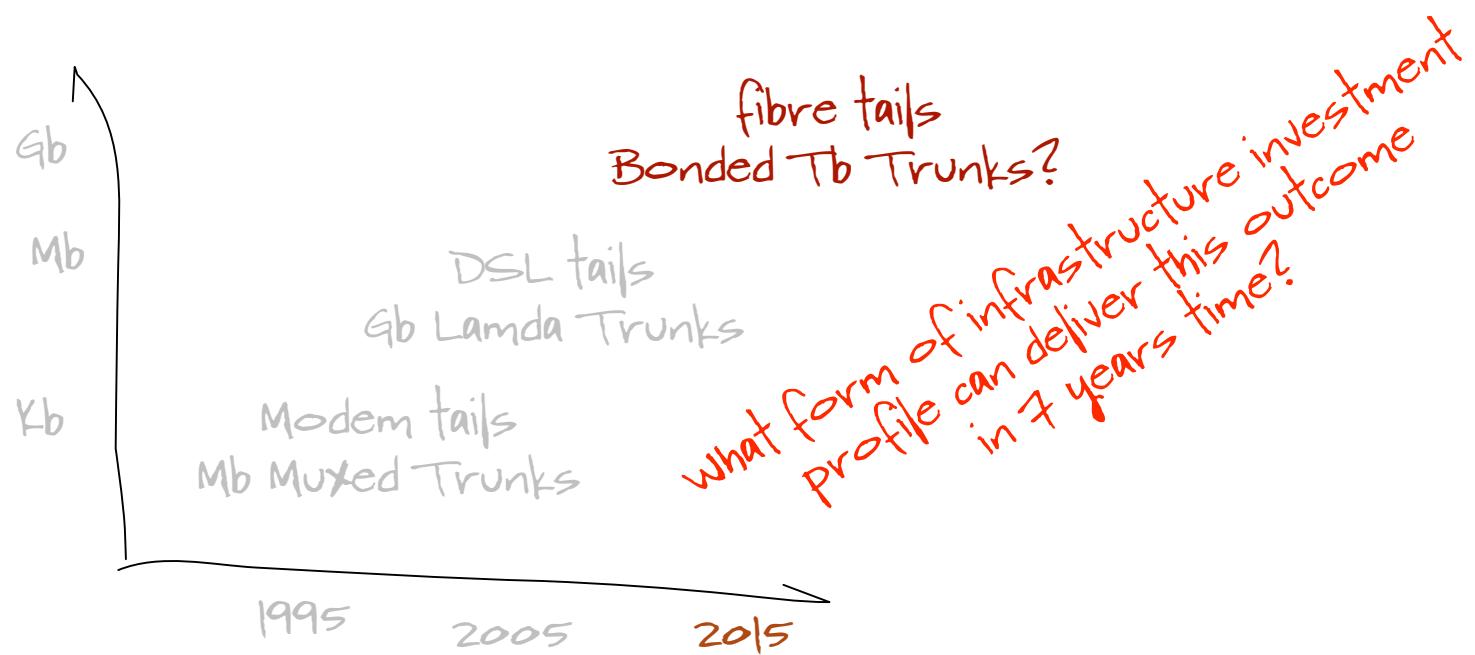
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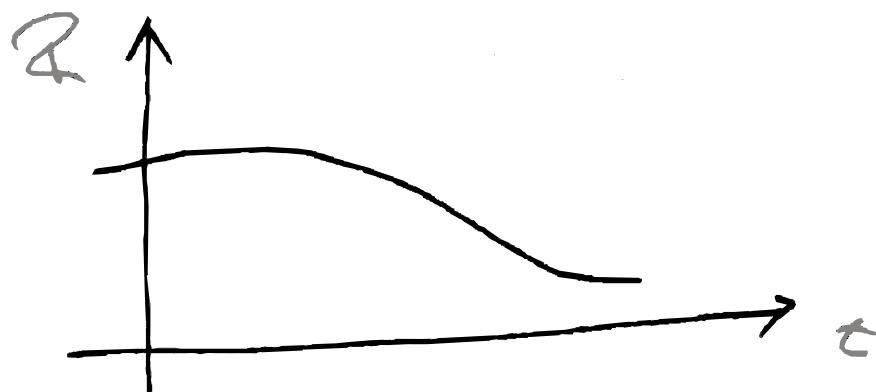


What's Happening Today: Demand for Bandwidth

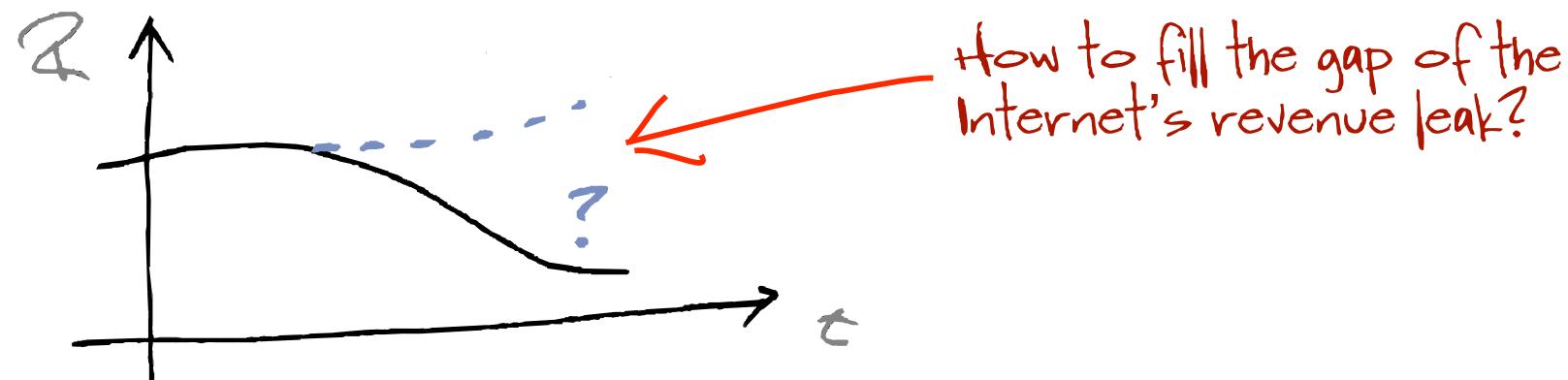
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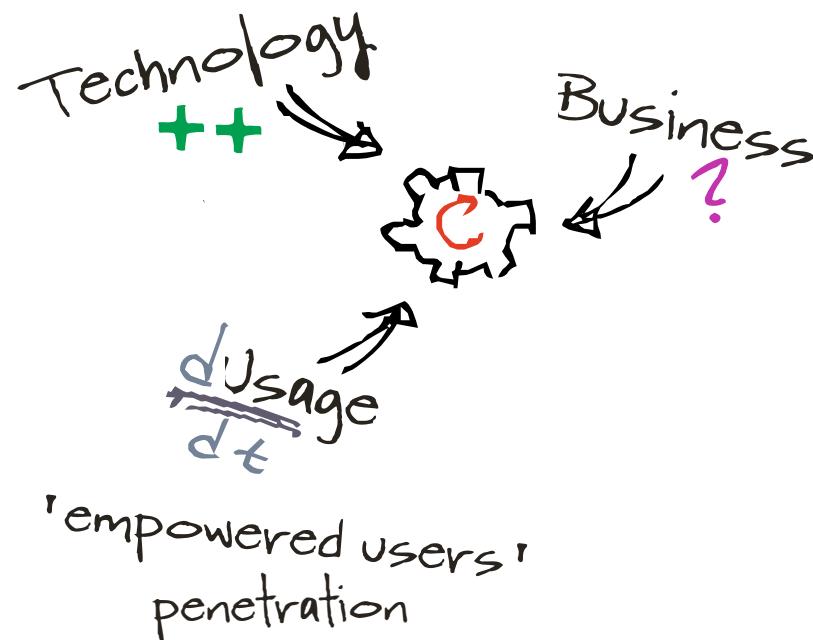
What's Happening Today: Declining Revenue Profile for incumbent telcos



What's Happening Today: Declining Revenue Profile for incumbent telcos



driver dimensions



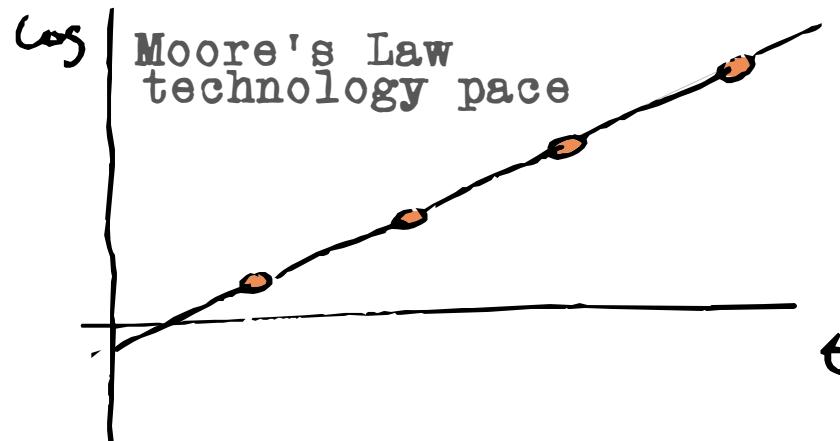
technology

++

surplus

rapid infill

enabling windows



technology

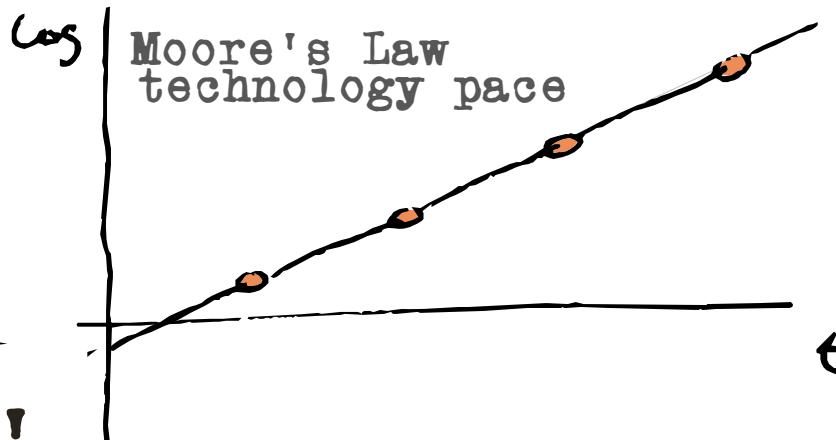
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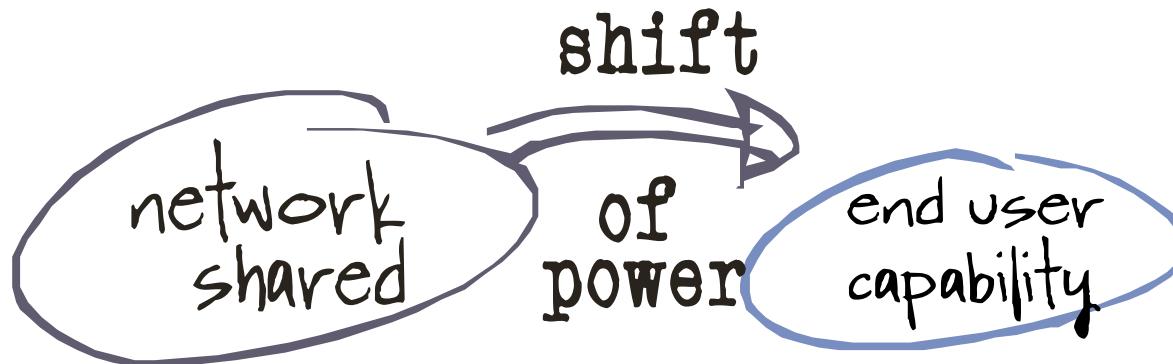
see it ... seize it !



technology

++

technology push and network architecture

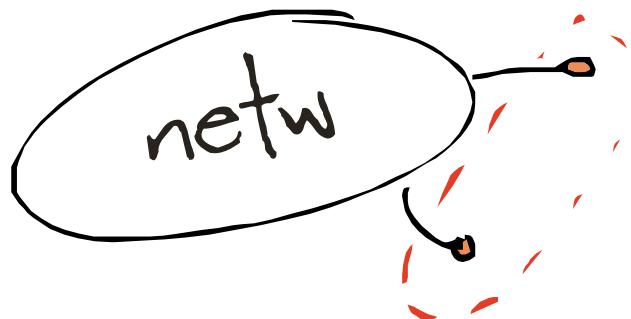


technology

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new production paradigms

"Over the top"
applications



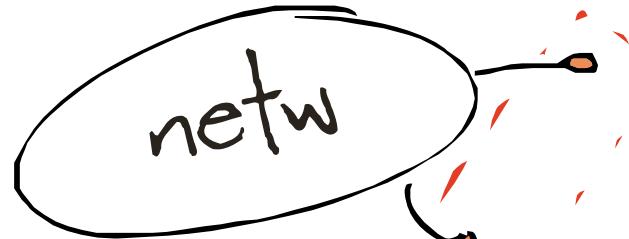
a 'network-service'
produced outside
of the 'network'

technology

++

new production
paradigms

"Over the top"
applications



a 'network-service'
produced outside
of the 'network'

Content production is a commodity application
that users sustain through sharing, rather than a
valuable service that is produced externally through
dedicated specialized production channels

technology

++

surplus enables
divergence

for
simplicity and
performance

technology

++

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~~QoS~~
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technology

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technology

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Web 2.0 enabled user generated
content

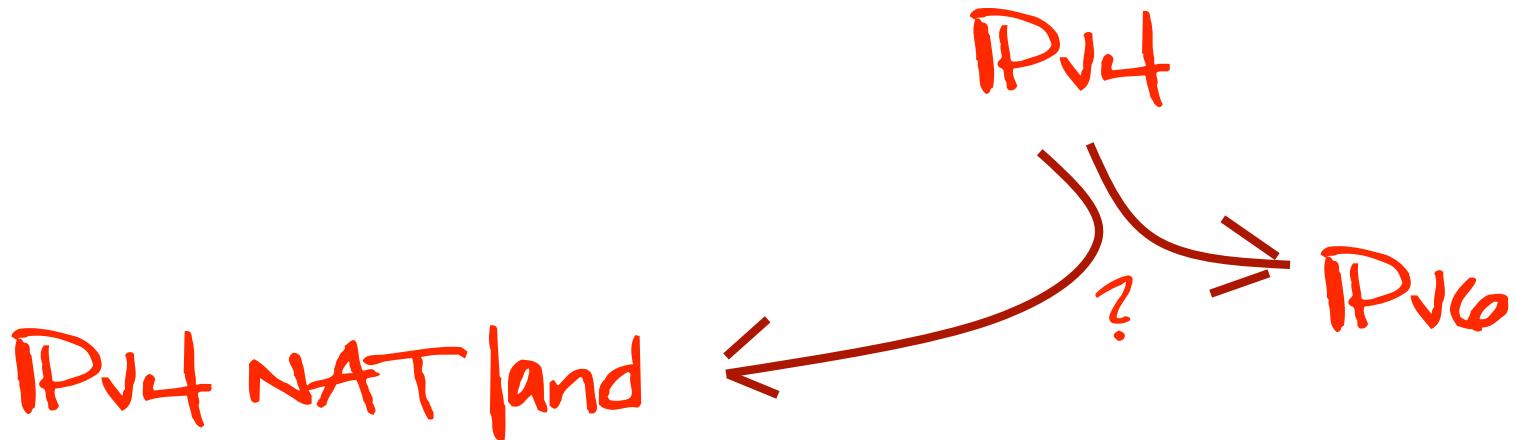
flickr
facebook youtube
doppler
google wikipedia

technology

++

tensions at the lower levels of the technology stack

Users simply want applications to work



Network operators often base their business model on driving complexity into the network

So who really wants a simple end-to-end IP network?

And who is willing to pay for it?

usage

fuelling the usage growth fire

usage = scaling

usage

fuelling the usage growth fire

Please send heaps more....

bandwidth
switching fibre routes
 routing
addressing delivering
silicon density power storage
memory speed heat dissipation
 storage efficiency

usage = scaling

Business modelling

?

is challenging when today's businesses appear
to have radically different ideas of what this
business is all about

Business modelling

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and very few of these ideas will be right!

And some of these ideas appear to be just plain wrong even now!

Business modelling

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..today operators
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and very few of these ideas will be right!

And some of these ideas
appear to be just plain wrong!

Business modelling

?

convergence

seamless networking

NGN - . . .

triple play

..today operators
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- ✿ Everyone is talking
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Business modelling

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triple play

- ✖ Everyone is talking about it
- ✖ Few have actual experience

Business modelling

?

..today operators
tend to be very
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convergence

seamless networking

NGN - . . .

triple play

- ✖ Everyone is talking about it
- ✖ Few have actual experience
- ✖ .. and the actual experiences are mostly failures

Business modelling

What are we learning?

?

- Packet pushing is a commodity utility activity

Low margins

Low barriers to entry

No product differentiation

Deregulation and competition

Valued services are overlays to the network

Business modelling

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- Traditional revenue streams are vaporizing

Wired telephony

Business data products

Local Access
monopolies

Mobile telephony

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monopolies

Mobile telephony

- Investors are still nervous about telcos

Cost of capital is high

Consumers are fleeing legacy telcos in the face of price gouging

Shareholder returns need to stay high

No residual expertise left in-house

Business modelling

?

Informed decision making about network infrastructure investment is the key to the next few years!

Poor network investment choices will lead to business failures

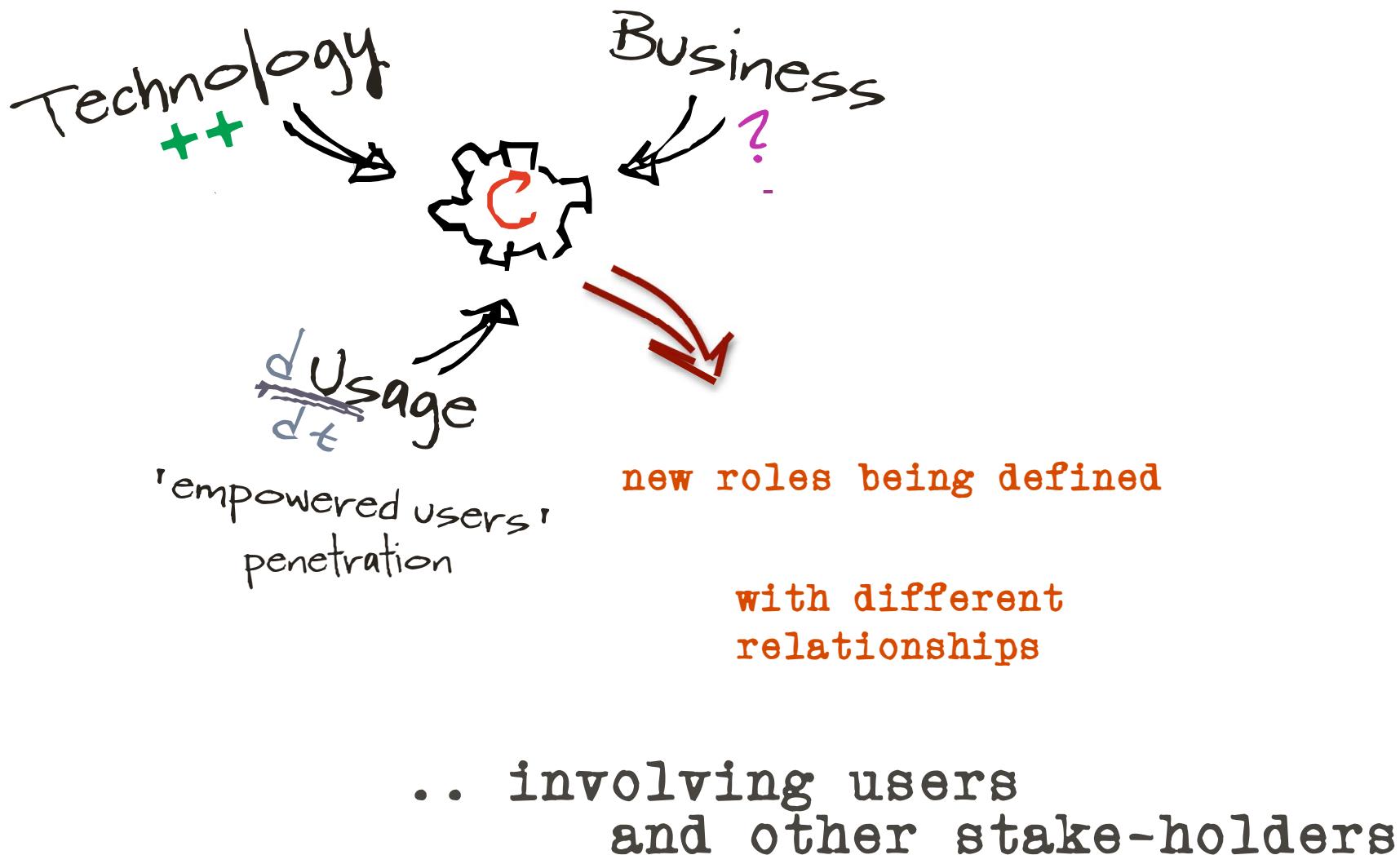
Those who are prepared to question the hype and construct their networks in a way that supports user needs will emerge as stronger ISP players

So where are we heading?

My personal view sees the following..

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My personal view sees the following..

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commodity utility
network operation

high capacity
packet pushing

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My personal view sees the following..

user - drive, production
p2p, content, ..

User-centric applications,
not network-centric services

Value shift up
the protocol stack



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network
commodity utility
network operation

high capacity
packet pushing

user - drive, production
p2p, content, ..

User-centric applications,
not network-centric services

Value shift up
the protocol stack

Reinvention:

opportunities will arise with

involving users

new partners

and different business models

a closing thought ...

I'm probably going to be proved wrong as much as I may be right with these thoughts. There is no certain track of progress here.

Each shift of the Internet's use paradigm through innovation is as much a surprise to the innovator as it is to everyone else.

Which is probably a very good thing!

Thank You!

Geoff Huston
gih@apnic.net