

Impact of architecture on governance: IPv6 and Internet post-IP



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Chief scientist Fing**

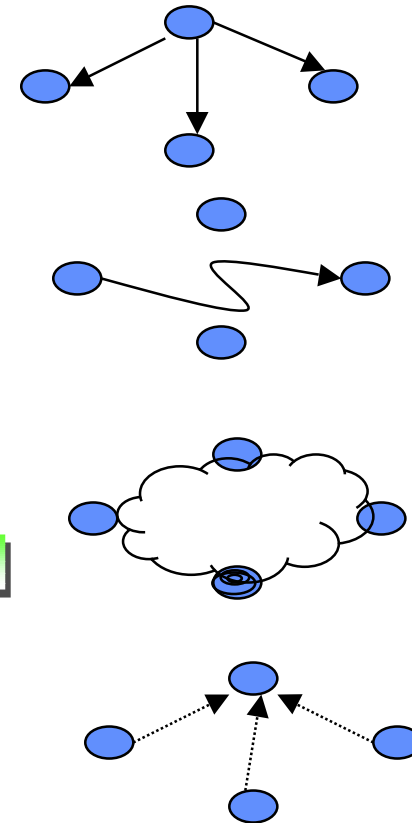
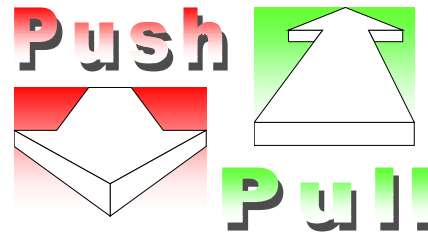
**Internet Governance:
Transparency Trust and Tools (IG3T)
*Technical Normalcy and Internet Governance:
Socio-Technical and Socio-Ethical Dimensions***

March 27th, 2009 - Milano



1st architectural choice: What is a network ?

- Media industry
- Telecommunication industry
- ICT industry
- Electronic Industry

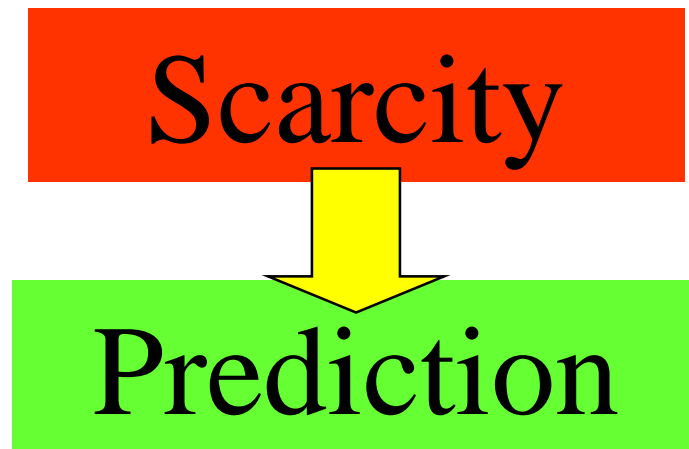


« Intelligence is at the edge of the network » Lawrence Lessig



2nd architectural choice: Telecom strategy

- 5 nine
99,999% availability
- Quality of service
scarcity of bandwidth
- Spectrum regulation
- ...

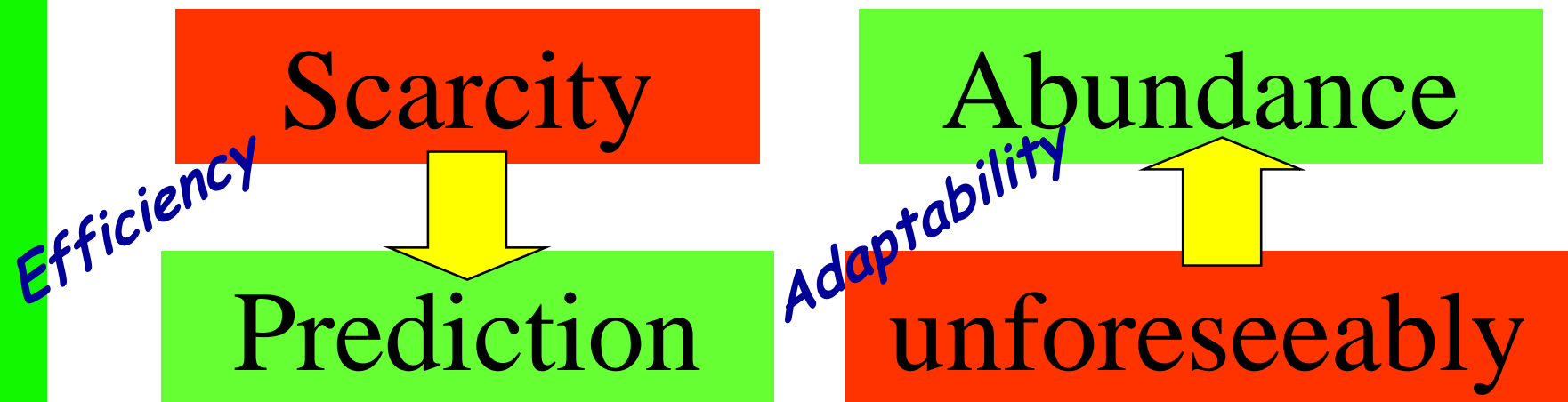




2nd architectural choice: Telecom strategy vs ICT strategy.

- 5 nine
99,999% availability
- Quality of service
scarcity of bandwidth
- Spectrum regulation
- ...

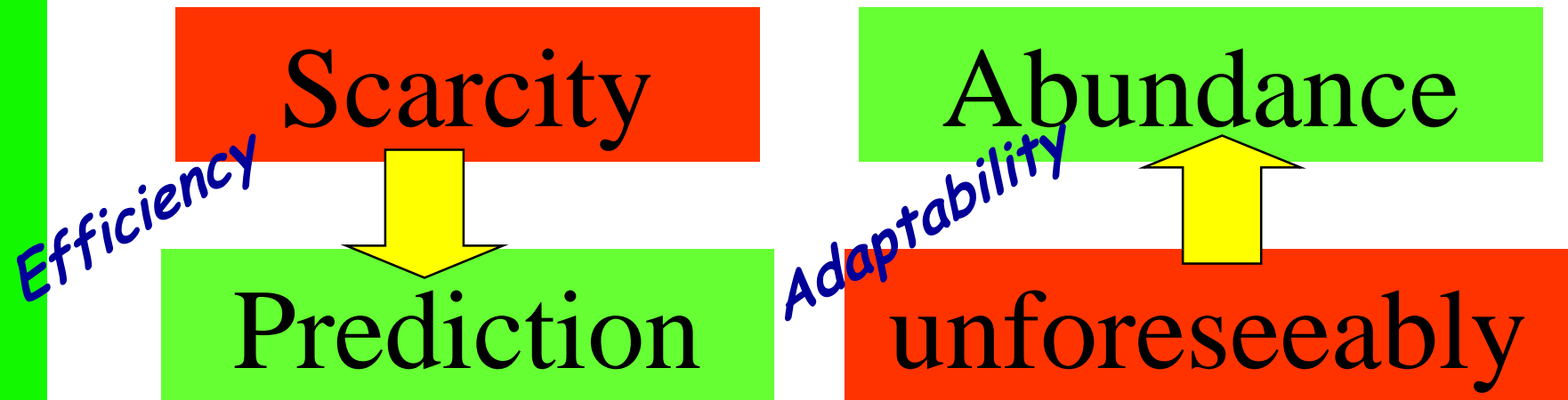
- Routing
vs commutation
- Best effort
unforeseeable traffic
- Cognitive radio
spectrum is empty!
- ...





Telecom strategy vs ICT strategy.

- Core networks
Expensive, complex
 - More users
1 billion humans + 1 billion objects
 - QoS for some applications
banking, video, IP phones...
 - ...
- Optical Fiber bandwidth
*OC3072 : 160 Gbps X 1022
internet 2008 ~ 128 Tbits/s*
 - Mobile throughput
X 1000 in six year
 - The cheaper, the best
 - ...

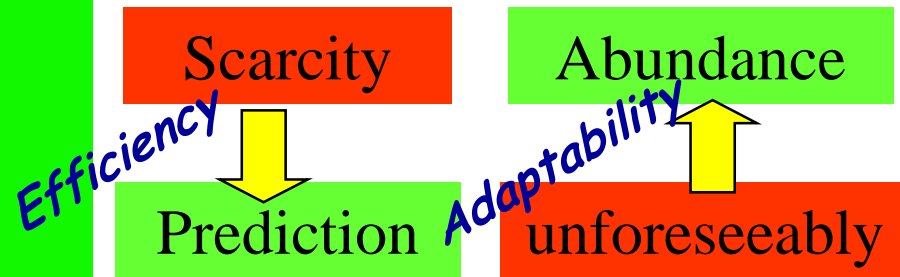


Networks requirements





Ethernet carrier grade for core networks



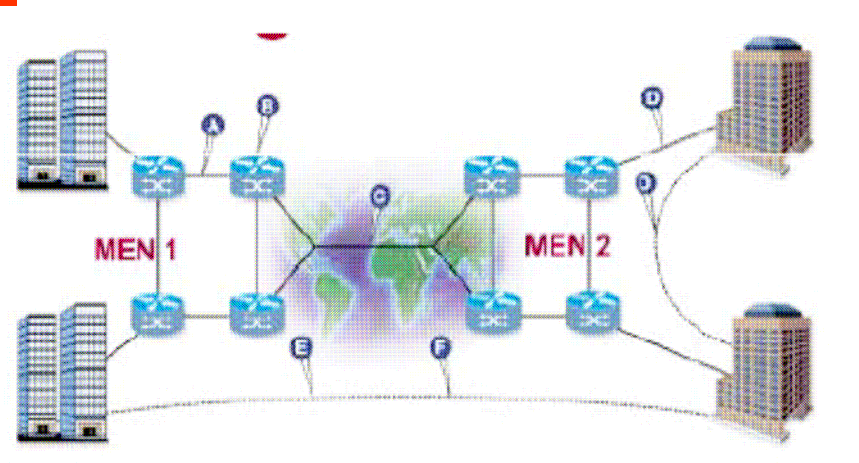
Carrier grade

- ▶ 99999
- ▶ scalability
(*hundred of millions of users*)
- ▶ Hard QoS
- ▶ Service Level Agreement (SLA)

Ethernet:

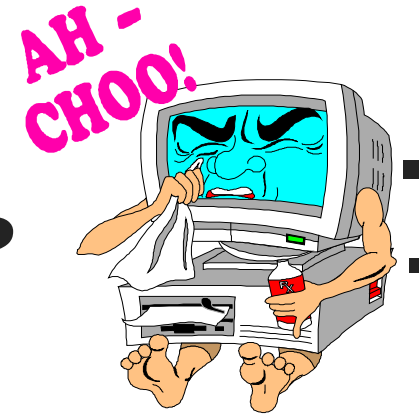
- ▶ Simple to implement, low cost
- ▶ first route (IP) then Commute (Ethernet+GMPLS)

Large dissemination





IPv6 For the whole network ?



■ Limits of IPv4

- ▶ security, mobility, QoS, multicast as extensions
- ▶ "only" 4 billions of addresses

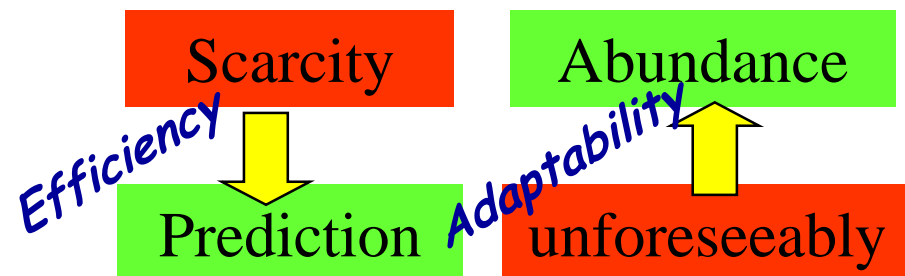
■ Ipv6 possibilities

- ▶ 340 282 366 920 938 463 463 374 607 431 701 211 156 adresses
- ▶ Options rather than extensions
- ▶ Auto-configuration

■ IPv6 deployment (Asia, France...)

■ IPv6 address space

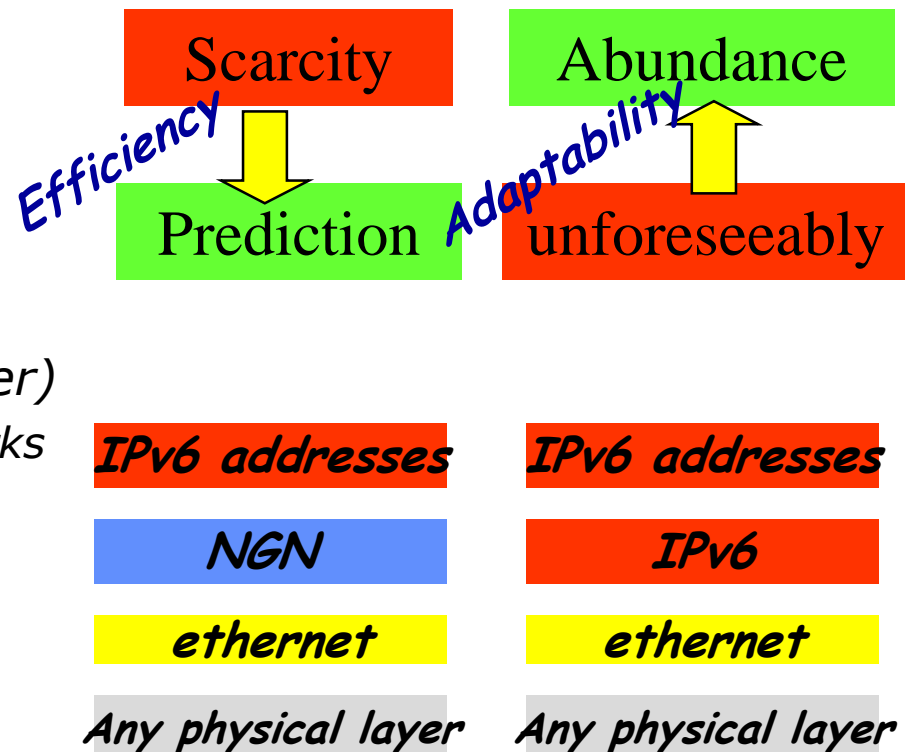
- ▶ even on other protocols
- ▶ objects: 6lowPAN/Zigbee





Next Generation Network NGN

- Start almost with a blank sheet
- Efficient network
 - ▶ Scalability
 - ▶ Quality of services
 - ▶ Security
- IP on the very top
(level 4 like the phone number)
 - ▶ *even in mobile phone networks*
- But not below
 - ▶ commutation rather than routing
 - ▶ for fixe AND mobile networks





Scarcity

Abundance

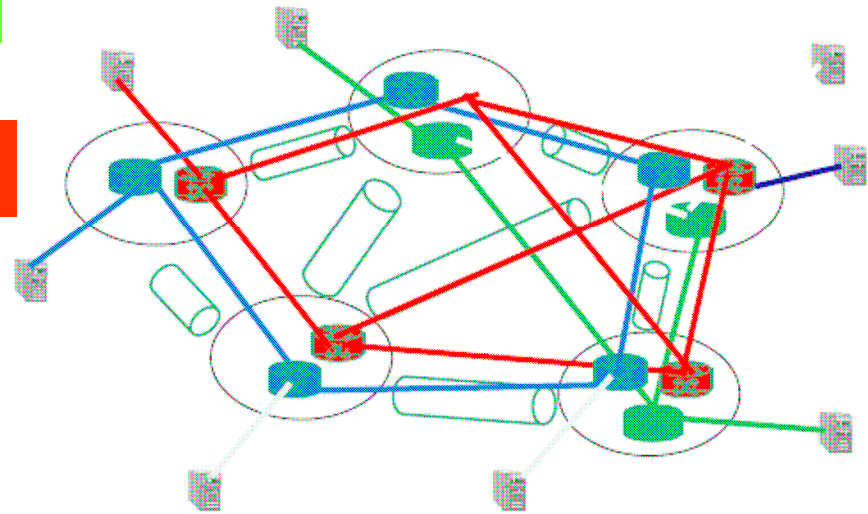
Prediction

unforeseeably

Efficiency

Adaptability

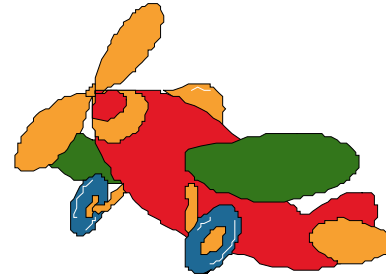
Virtual routers *Geni...*



*Who will win ? IPv6 or NGN ? ...
Don't care !*

- Networks with various requirements
- Upgrading to a new version of a protocol
- Testing innovative protocols
- Switch in another network in case of attack
- Mutualisation between providers

Autonomic computing



- Manual piloting
- A pilot with the help of some self-control systems
- Self Piloting

1905

1968

1980

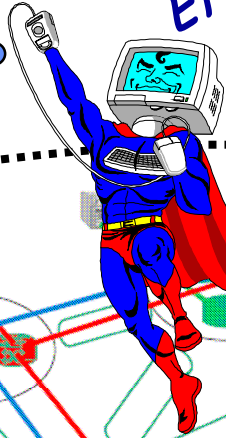
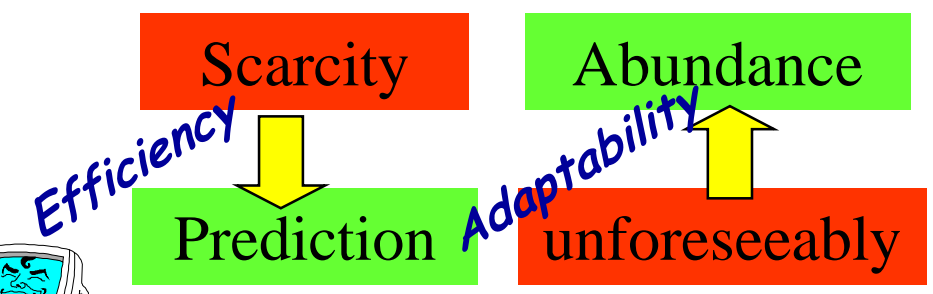
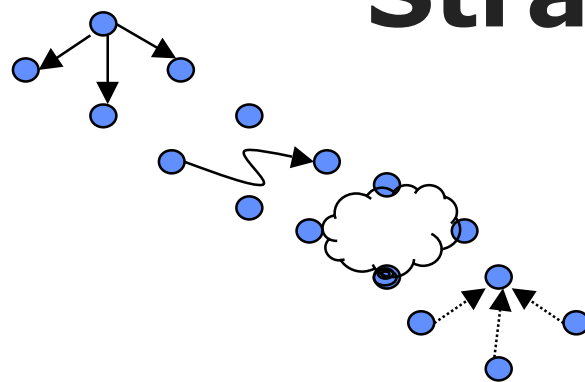
2000

2012

2012 ?

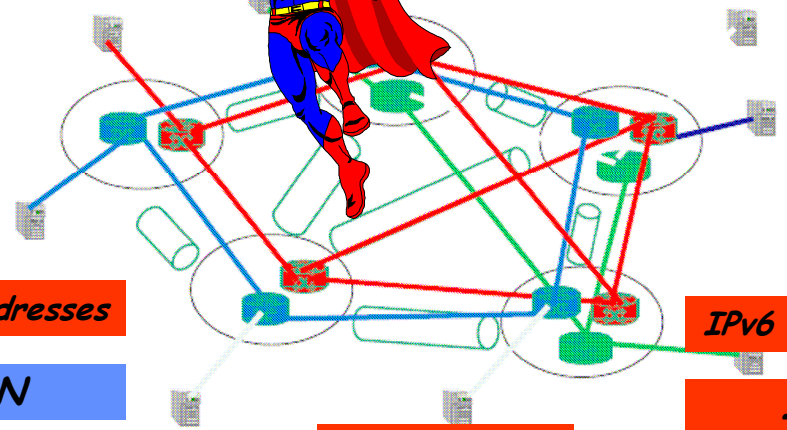


Strategies for the future



- IPv6 addresses
- NGN
- ethernet
- Any physical layer

- IPv6 addresses
- NGN
- Ethernet carrier grade
- Optical fiber



- IPv6 addresses
- Zigbee
- Wireless

- IPv6 addresses
- IPv6
- ethernet
- Any physical layer

- IPv6 addresses
- IPv4
- ethernet
- Any physical layer