

IPv6, is it really a good idea?

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New title:
The Future of NAT
(Network Address Translator)

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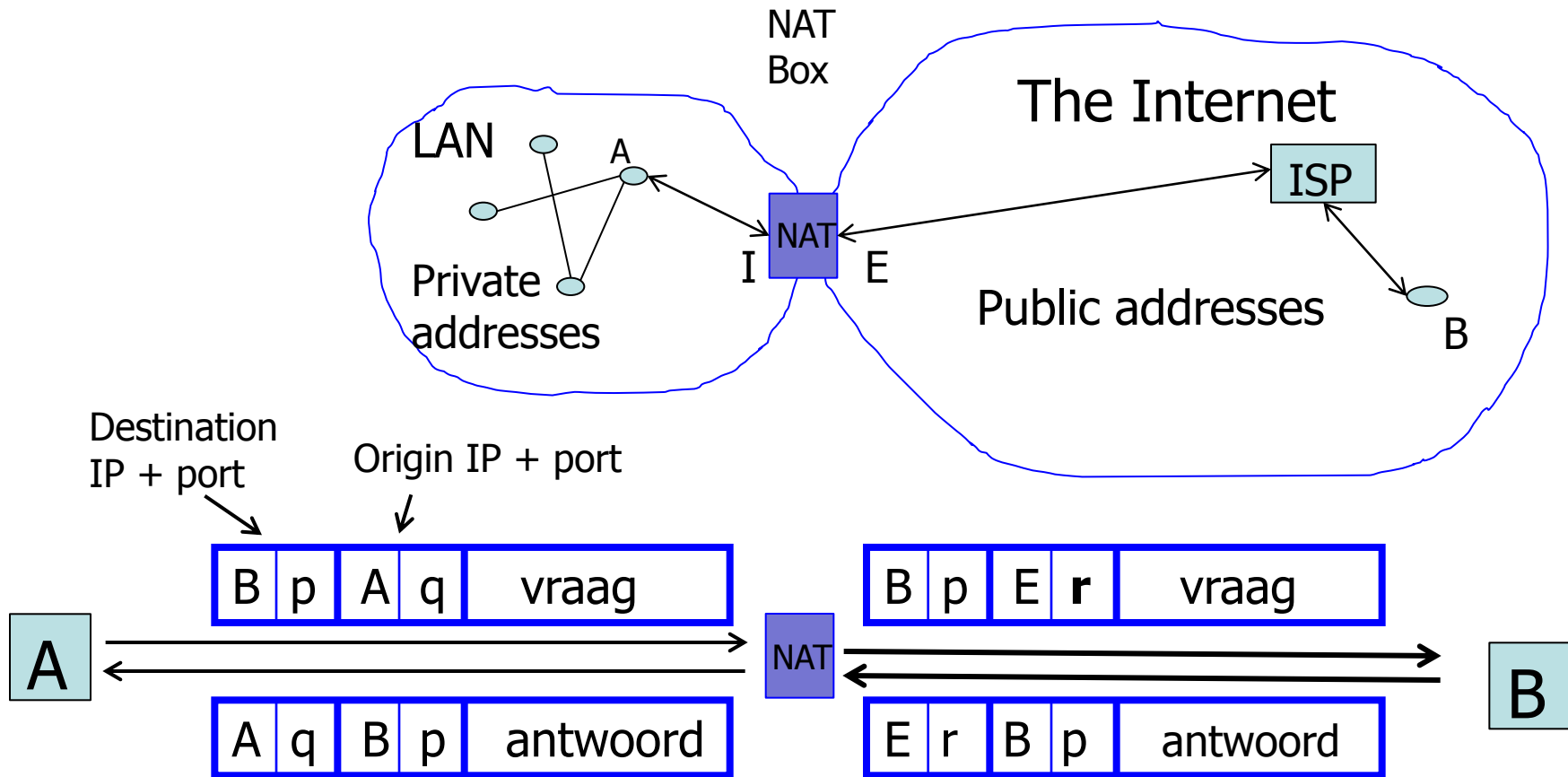
What's the problem?

- IPv4 is depleted, something is going to change
- IPv6 adoption is a struggle
 - Incompatibility IPv6 – IPv4
 - Application – network dependencies
 - Chain dependencies
 - Metcalfe's law => critical mass problem
 - Immaturity of transition tools

Some observations

- 1995: **two solutions** to address scarcity
one compatible (NAT), one not (IPv6)
- NAT: a tremendous success, IPv6 is still to become a success
- “NAT is ugly”, breaks the End-to-End principle

NAT: Network Address Translation



Why is NAT considered ugly?

NAT breaks the

- Global address space
- End to End principle (simple network, just routing)

These principles intend to

make communication possible and simple

But ...

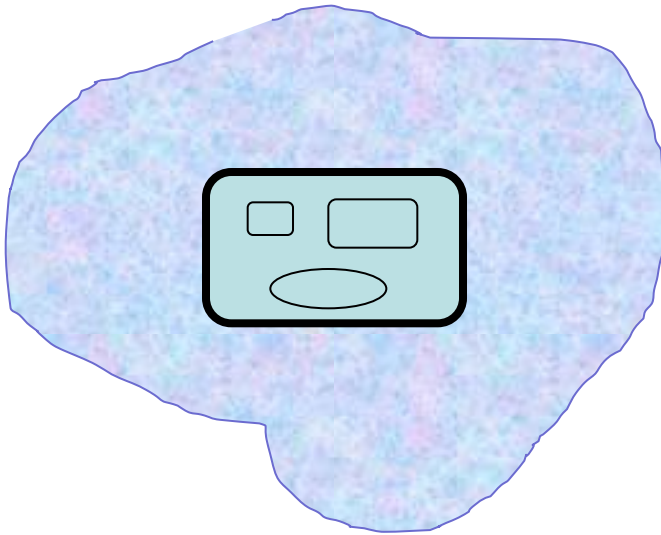
- Global address space => global dependencies
(making f.i. IPv6's introduction so hard)
- End-to-End: it's a prisoner's dilemma, everybody has to cooperate and behave decently

⇒ Both principles have been abandoned in practice

⇒ IPv6 will not restore them

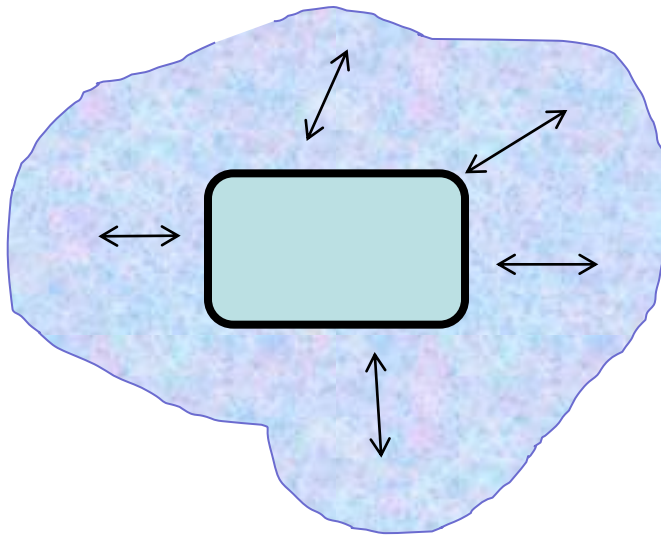
A different principle: Networks should become Systems

What are systems?



- A system is anything that can be distinguished from its environment.
- It has
 - A boundary
 - An inside
 - An outside (= environment)
- It consists internally of subsystems, themselves systems (recursive notion!)

Why systems?



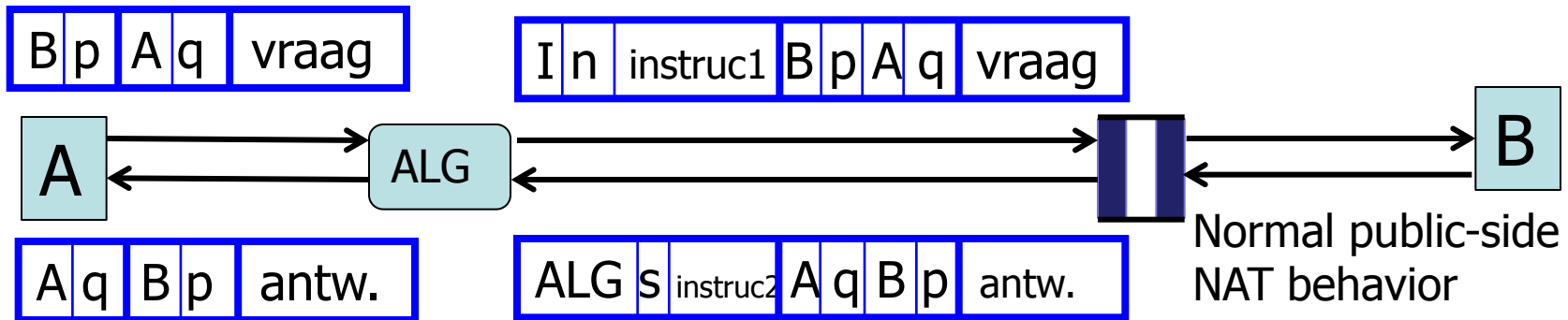
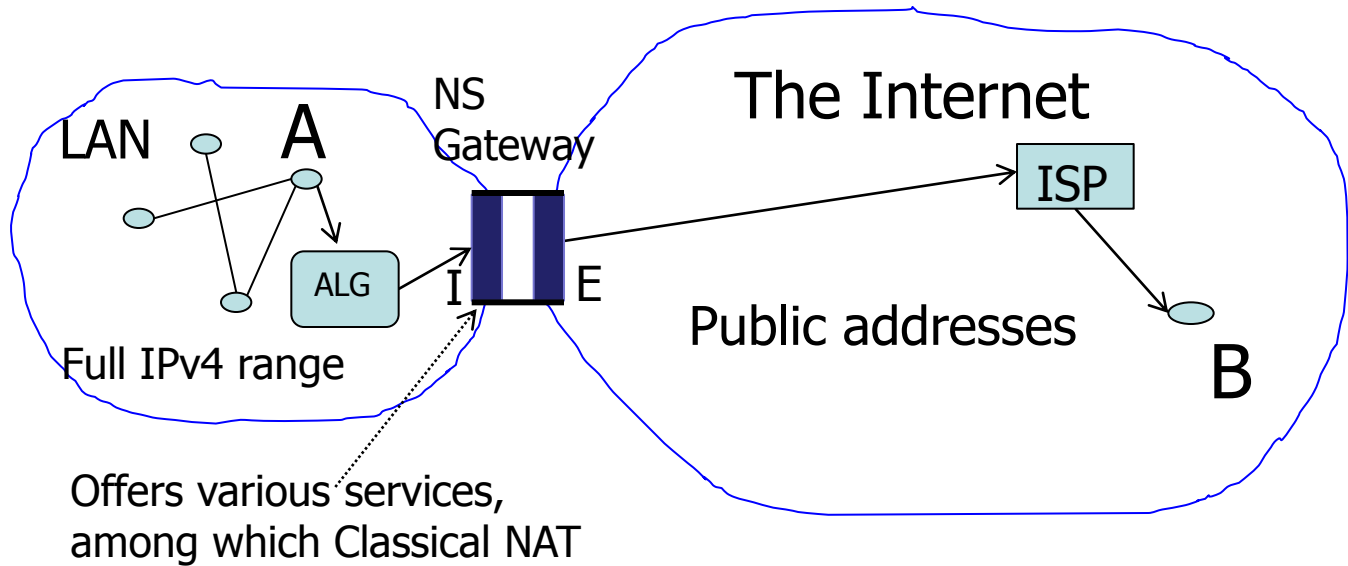
Black boxes with an interface:

Reducing complexity by concentrating dependencies, between inside and outside, in the boundary

For instance: the **names** used within the system: keep them local, make translations in the boundary.

A namespace gateway: a better NAT

Communication between legacy app's A and B



Why is this a better NAT?

Classical NAT drawbacks

- NAT box is a bottleneck
- Namespaces not fully separated
=> NAT cannot be nested
- Number of user limited by the 2-byte TCP port number

Namespace gateway

- Can be distributed
- Namespaces fully separated
- Port limit only when communicating with the legacy IPv4 net

Example: the namespace gateway as an IPv6 transition tool

Why should people use name space gateways?

- Current NAT is a tremendous hurdle to any architectural improvement
- NAT + address markets still offer a huge growth potential for the Internet
- A pressing need to change will still take a long time

Conclusions

- The black-box-with-interface model is more future- and growth-proof than the global address space with the E2E principle
- Current NAT comes closest to the black-box model, no reason to abandon it
- A lot can still be improved within NAT
- A pressing need to change is still way into the future
- You can safely wait and see what will happen...