

# Teredo Extensions

draft-thaler-v6ops-teredo-extensions-01.txt

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# [MS-TERE]: Teredo Extensions

- Two IETFs ago, URL for Microsoft doc posted to the list
  - <http://msdn2.microsoft.com/en-us/library/cc247482.aspx>
- This documented what Windows XP/Vista/Windows 7 already does
- It contains several things:
  - Security updates:
    - Now in draft-krishnan-v6ops-teredo-update
  - Support for more NAT types:
    - Now in **draft-thaler-v6ops-teredo-extensions**
  - Efficiency (server load) improvement:
    - Now in **draft-thaler-v6ops-teredo-extensions**

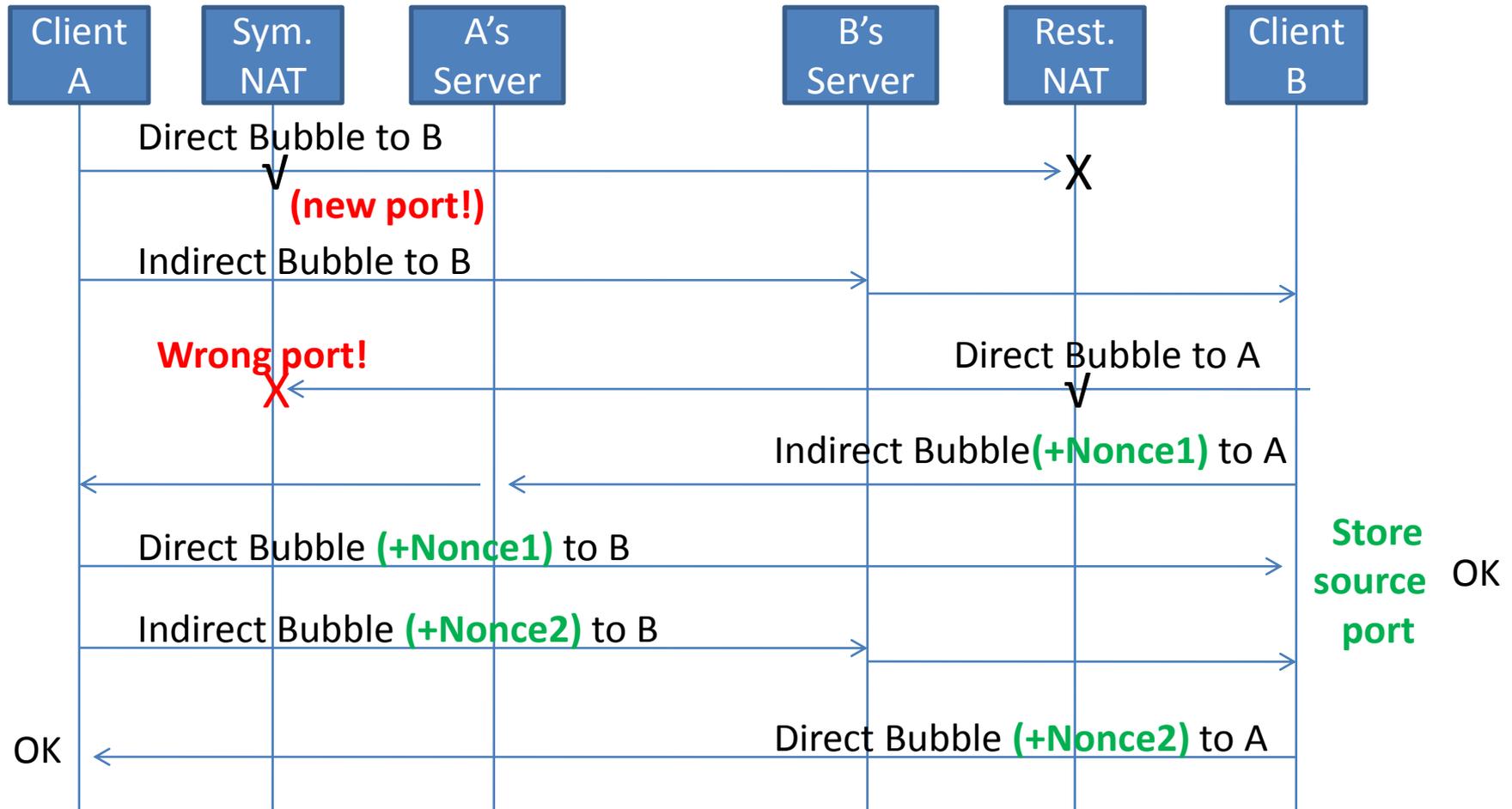
# NAT Types

Dest NAT	Cone	Address Restricted	Port Restricted	Port Rest. +UPnP	Port Sym. +UPnP	Port Pres Port Sym.	Seq. port sym.	Port. Sym.	Address Sym.
Cone	√	√	√	√	1	1	1	1	1
Addr. Rest.	√	√	√	√	1	1	1	1	-
Port Rest.	√	√	√	√	-	1+3	1+4	-	-
Port rest + UPnP	√	√	√	√	1+2	-	-	-	-
Port sym. + UPnP	1	1	-	1+2	1+2	-	-	-	-
Port pres. Port sym.	1	1	1+3	-	-	1+3	1+4	-	-
Seq.port sym.	1	1	1+4	-	-	1+4	-	-	-
Port sym.	1	1	-	-	-	-	-	-	-
Addr. Sym.	1	-	-	-	-	-	-	-	-

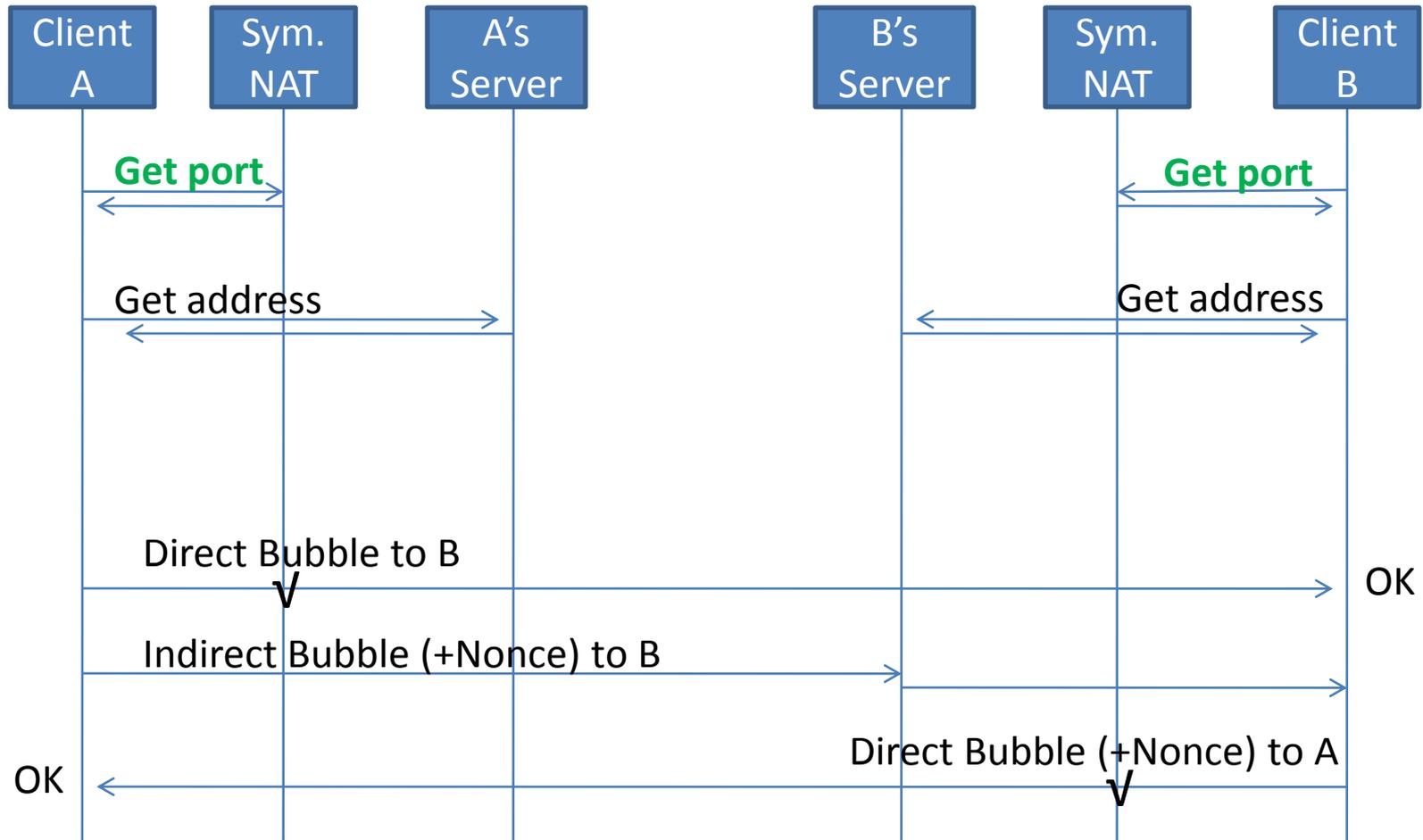
# Some statistics on NAT types

- Based on a study in August 2007 on NAT types:
  - ~15% chance a direct connection between two peers would work
  - ~64% chance an RFC4380 Teredo connection would work
  - ~84% chance a Teredo+extensions01 connection would work
  - Still better with latest extension for sequential NATs
- For multiparty apps, inverse network effect means even worse percentage
- Doesn't require **data** to flow through some server
- Can get 100% if you use a data relay protocol but more expensive to host such relays
  - Goal is to optimize for peer-to-peer to minimize cost

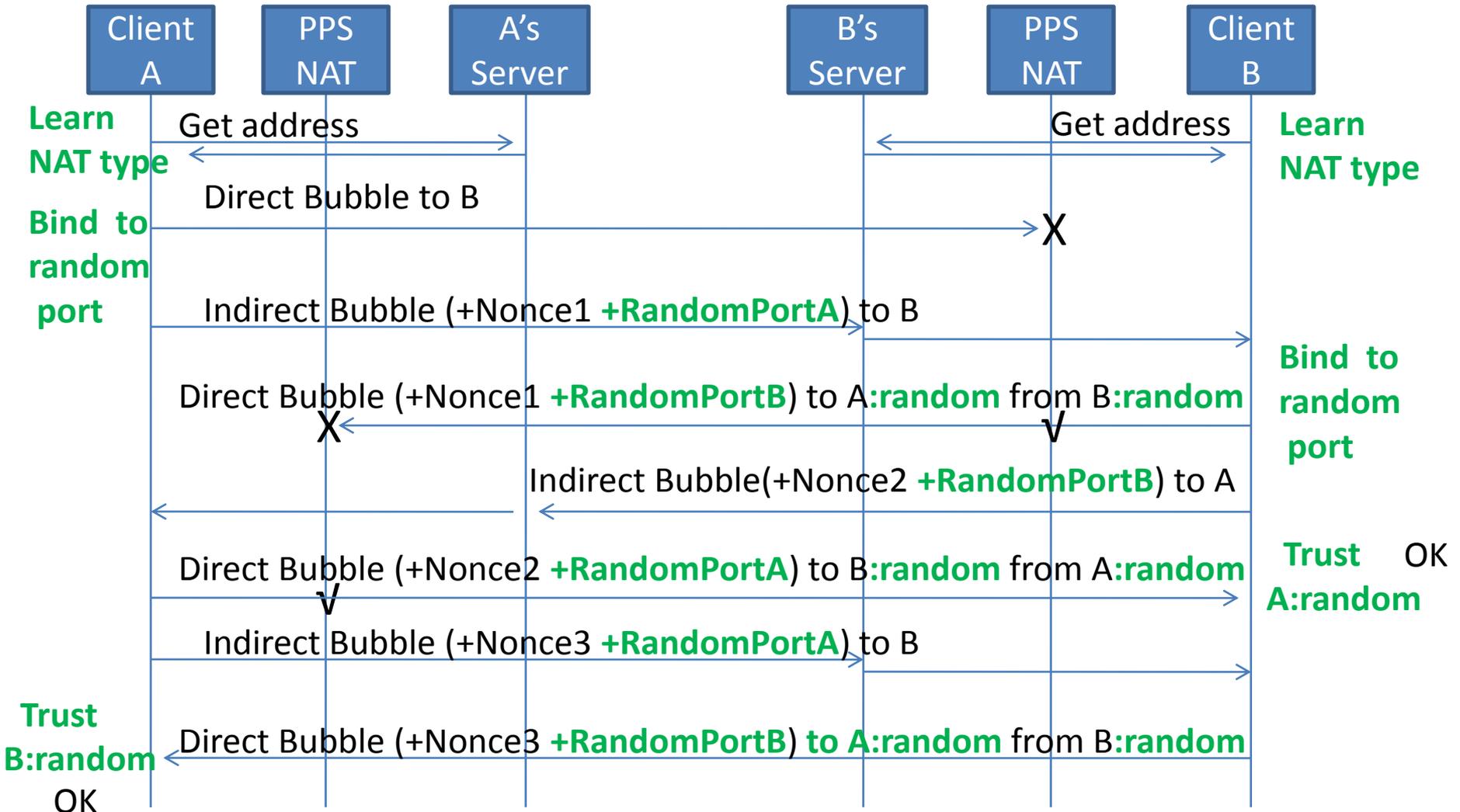
# 1) Symmetric NAT Example



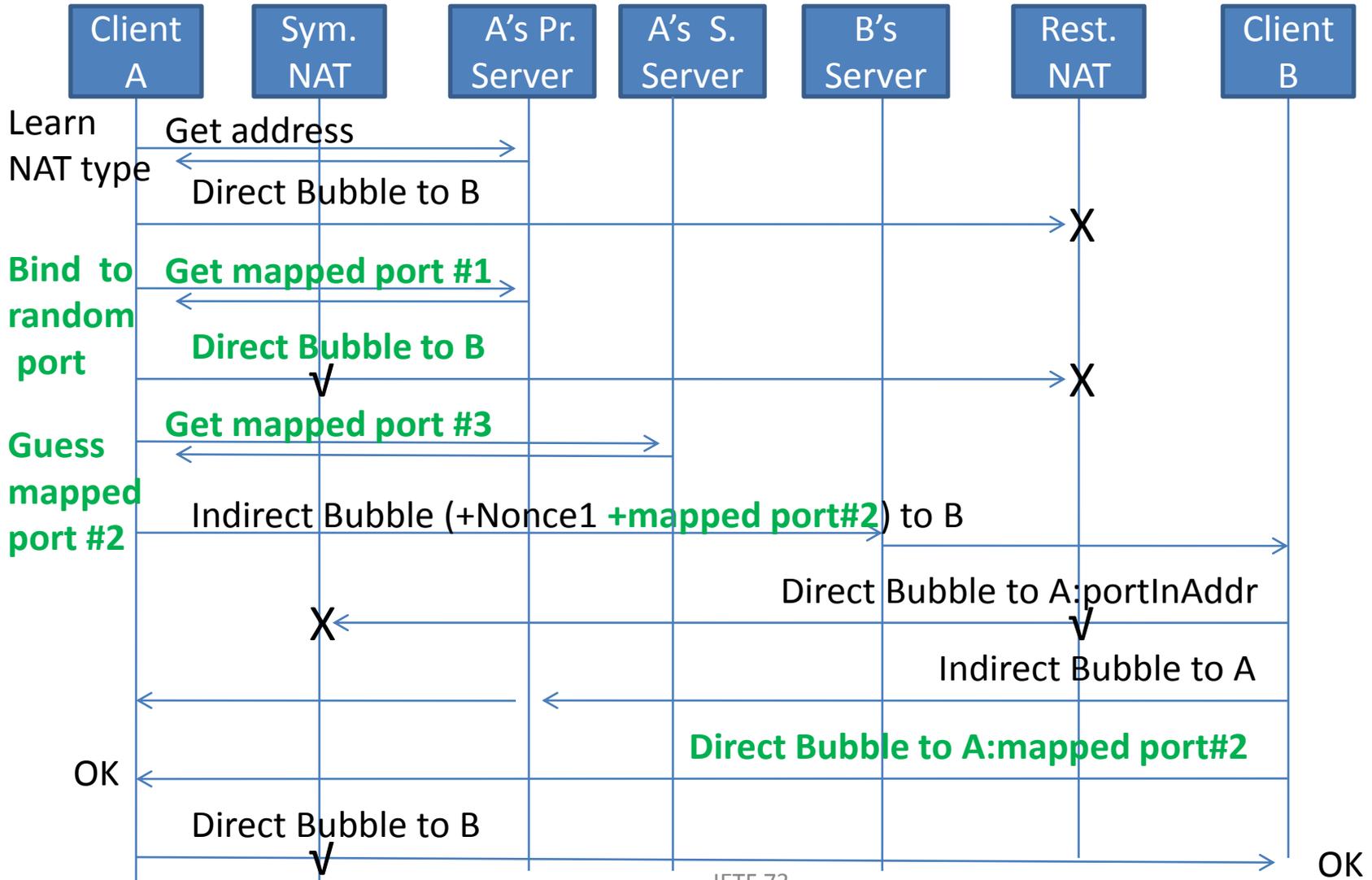
## 2) UPnP-Enabled Symmetric NATs



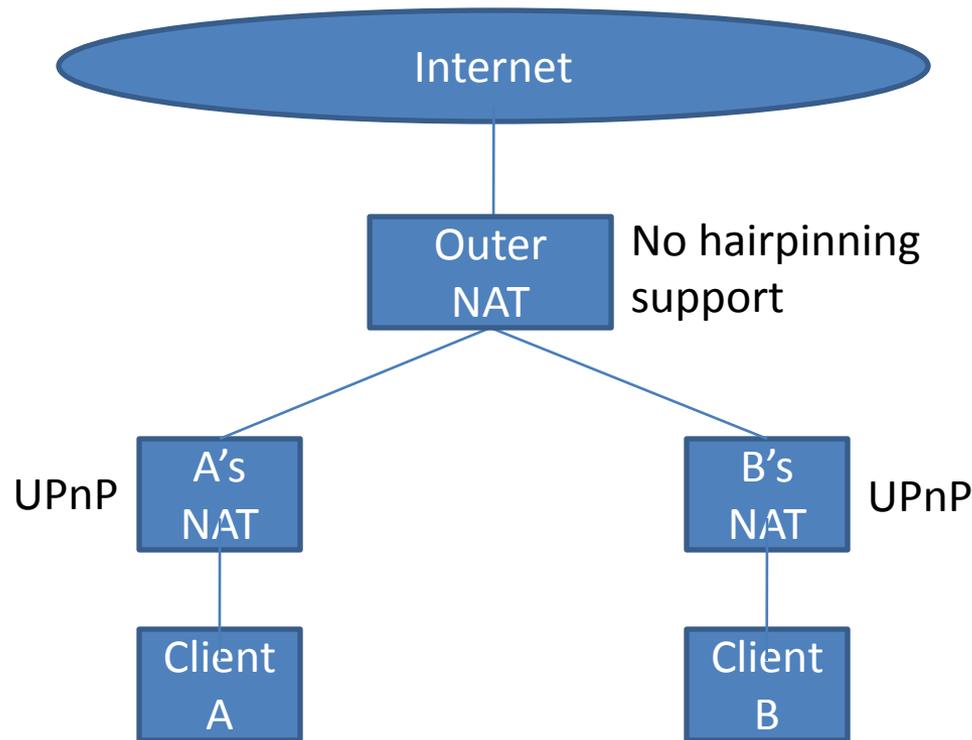
# 3) Port-Preserving Symmetric NATs



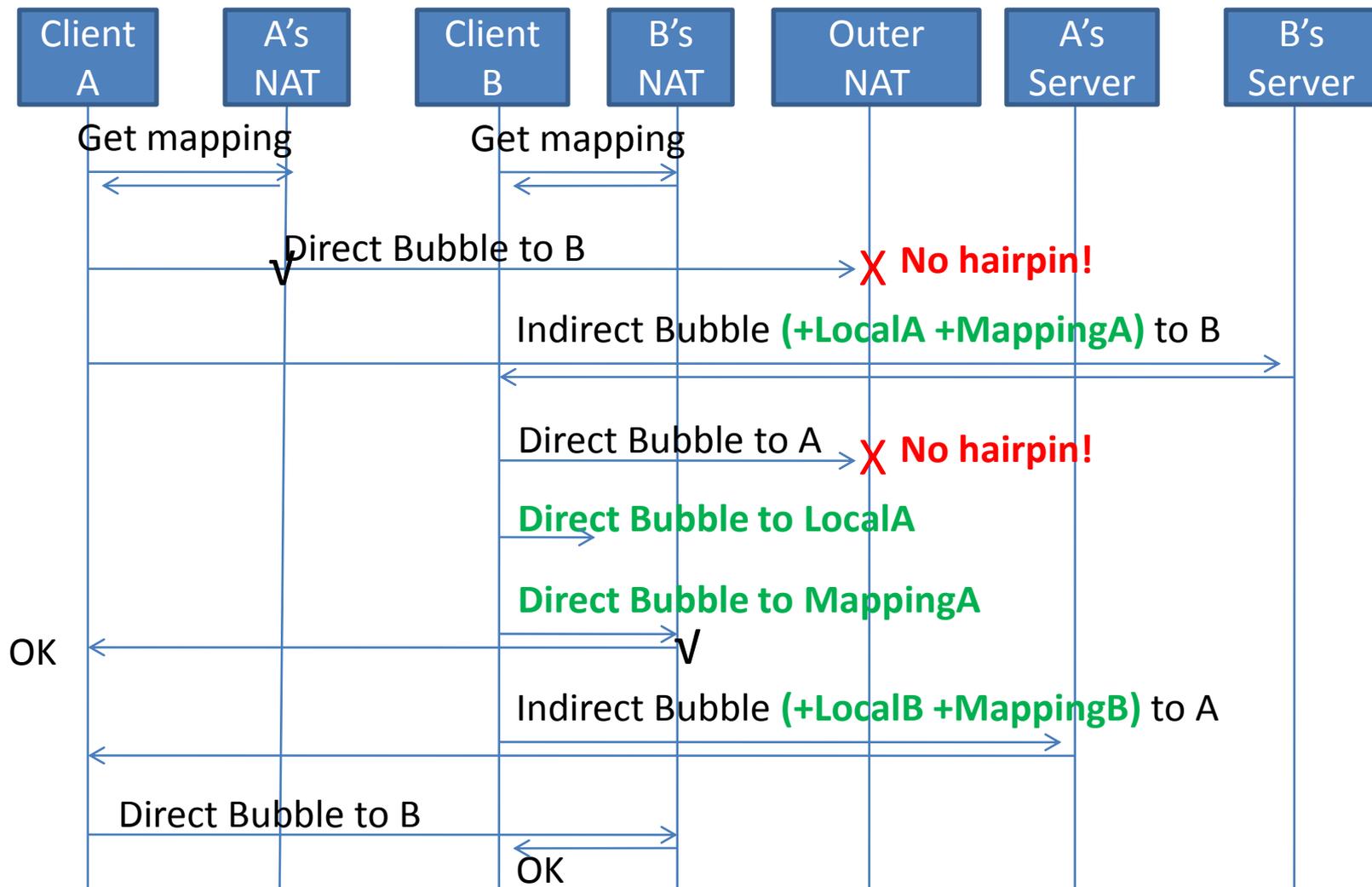
# 4) Sequential NAT



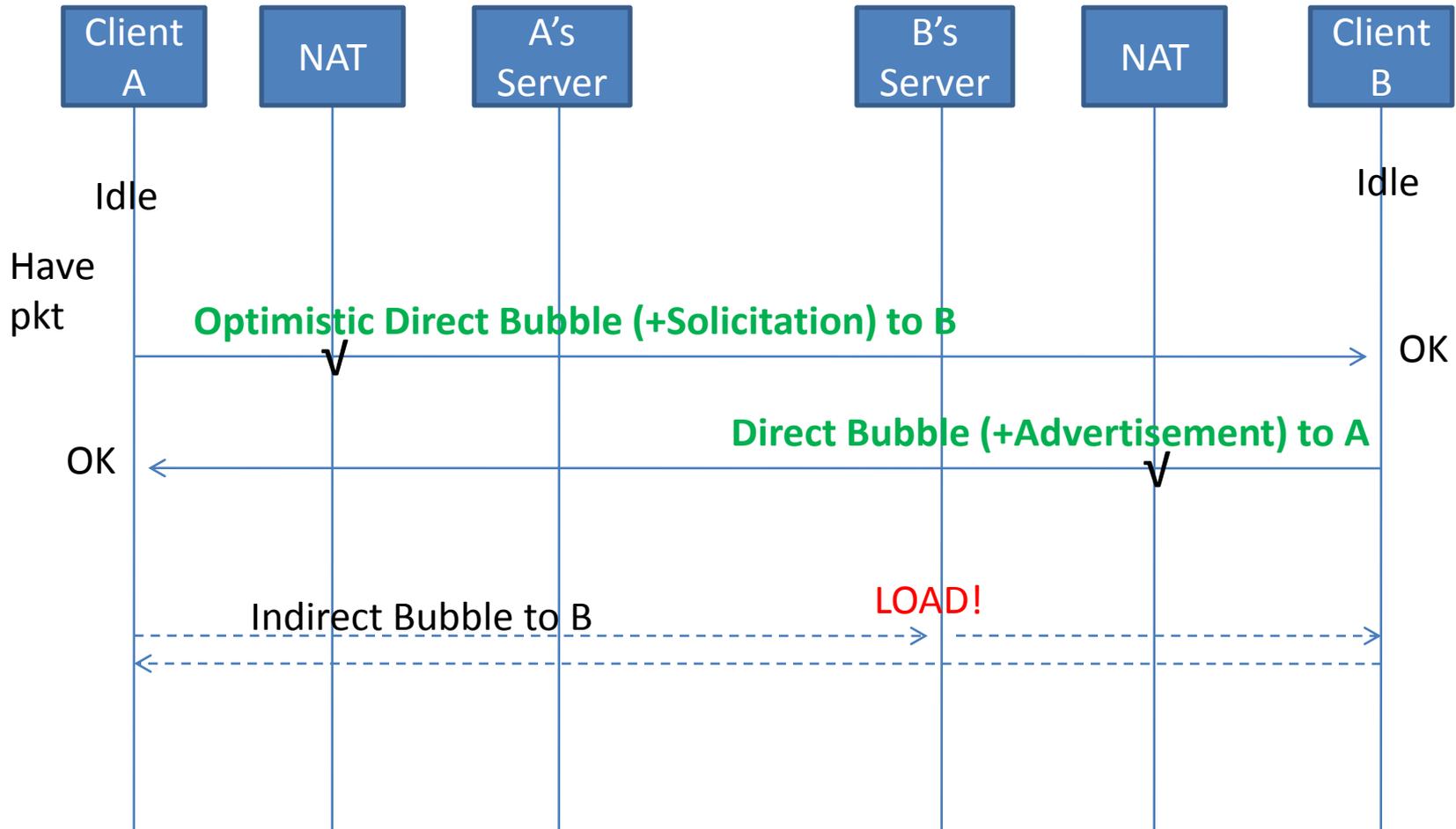
# 5) Hairpinning Example



# 5) Hairpinning Example (cont.)



# 6) Server Load Reduction



# Next Steps

- Get feedback
- AD-sponsored individual submission through INTAREA
- “Last call” in V6OPS due to history