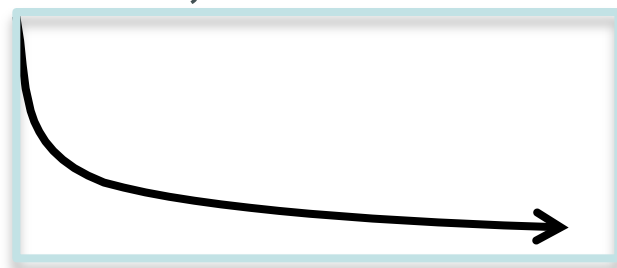


NAT: Two Purposes for Transition

1. Share IPv4 addresses: NAT44
2. Connect IPvX hosts to IPvY hosts:
NAT64

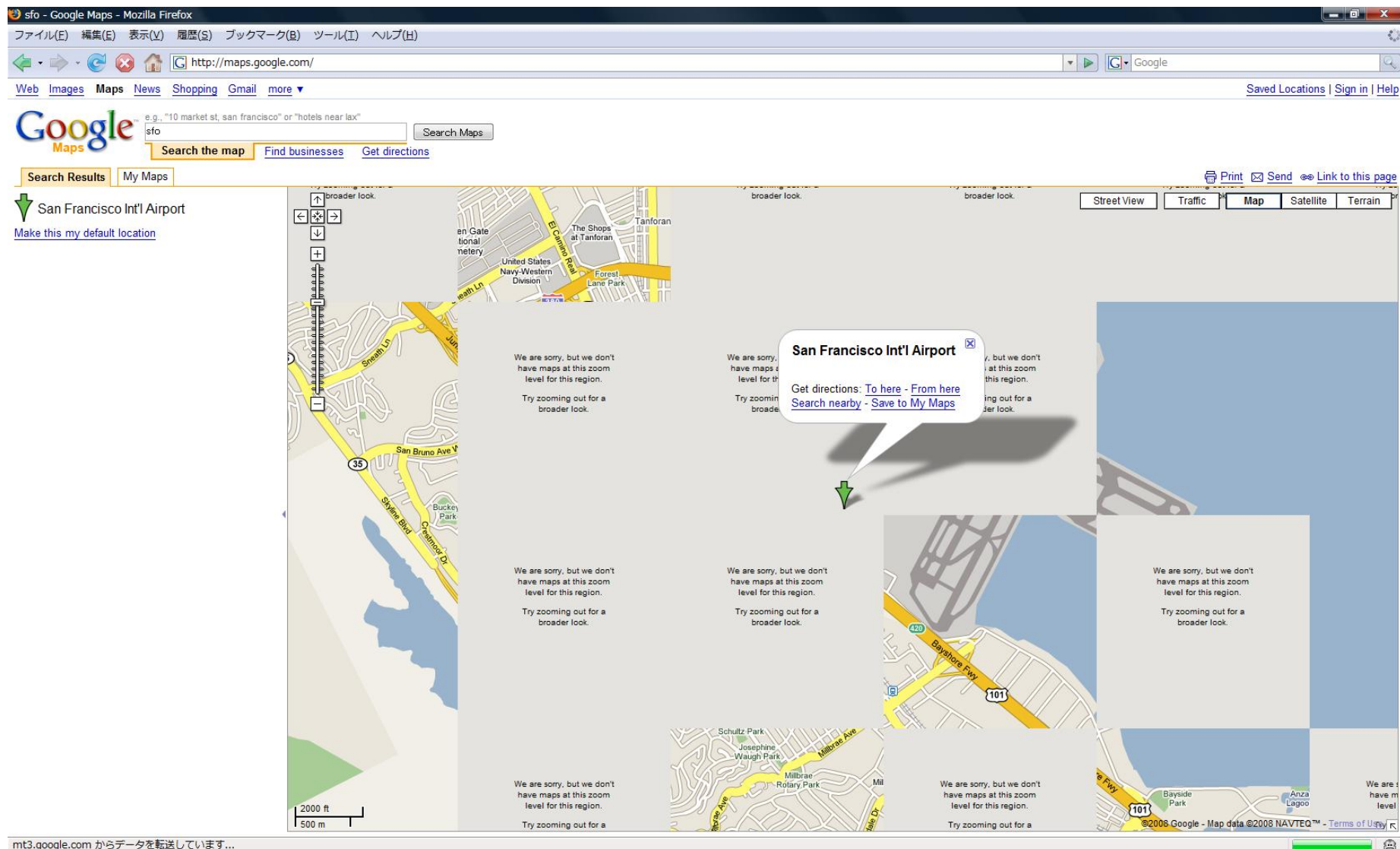
1. Share IPv4 Addresses

- Still lots of IPv4 content
 - School websites, day care websites, ...
- Still lots of IPv4 applications
 - Skype, IP televisions
- Not enough IPv4 addresses
 - dual stack consumes IPv4 address at the same rate
- NAT is not perfect. NAT at edge to minimize impact.
- NAT Purpose 1: share IPv4 addresses among hosts



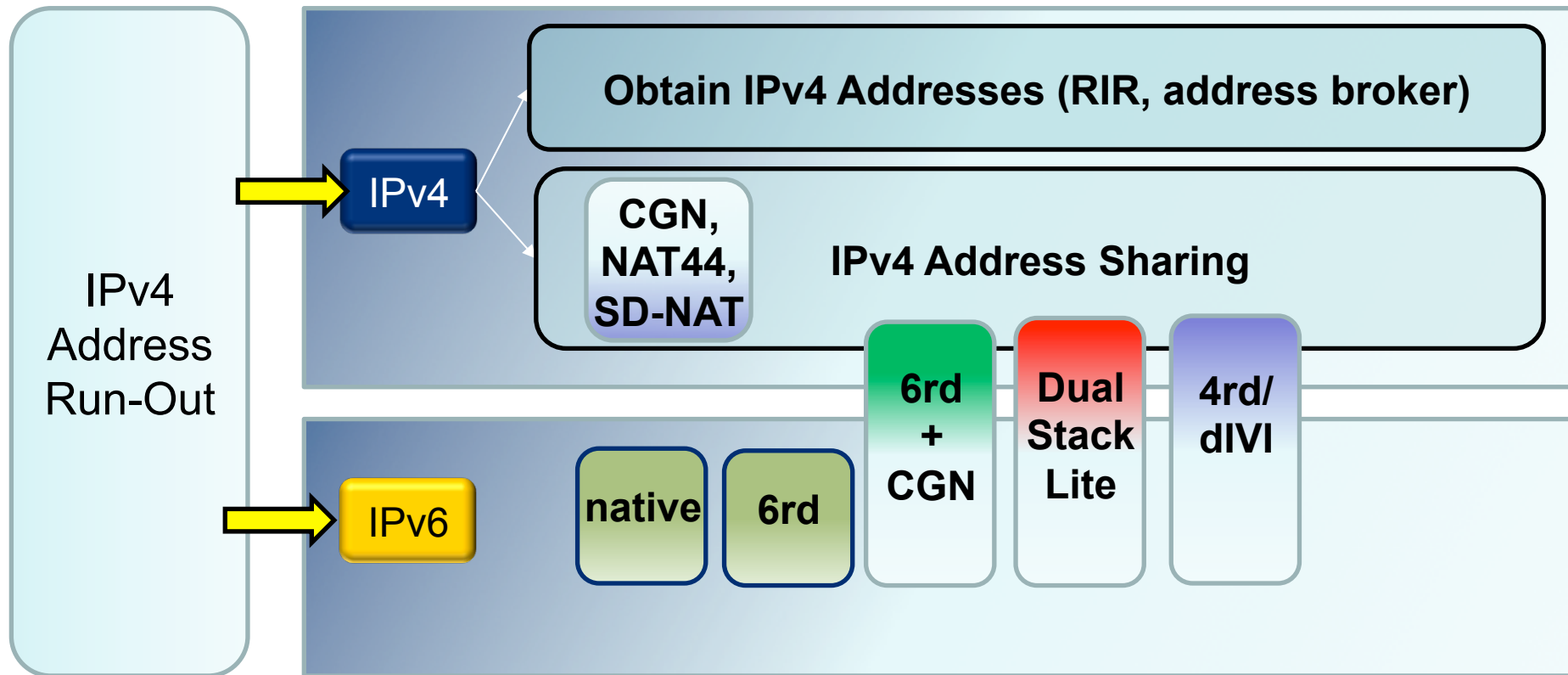
IPv4-only long tail

Address Sharing Gone Bad

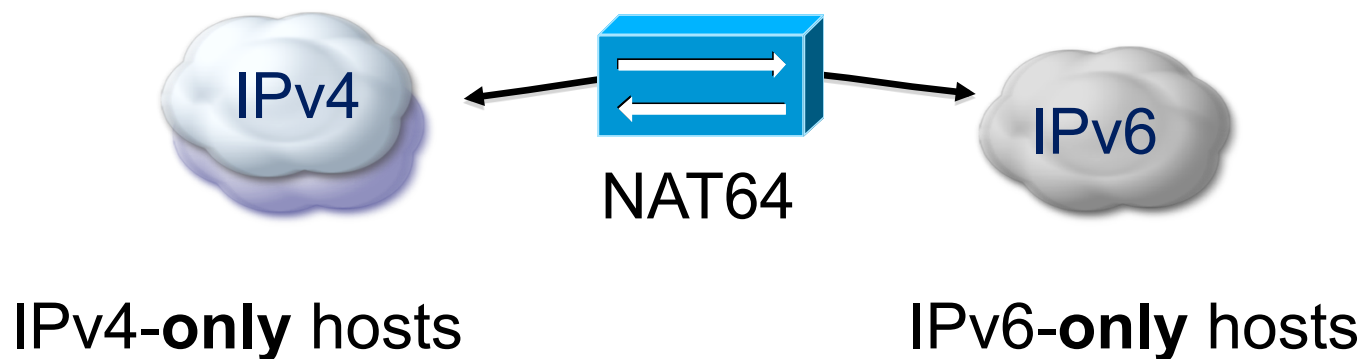


Source: Shin Miyakawa, NTT Communications

IPv4 Address Sharing Technologies



2. Connect IPvX to IPvY

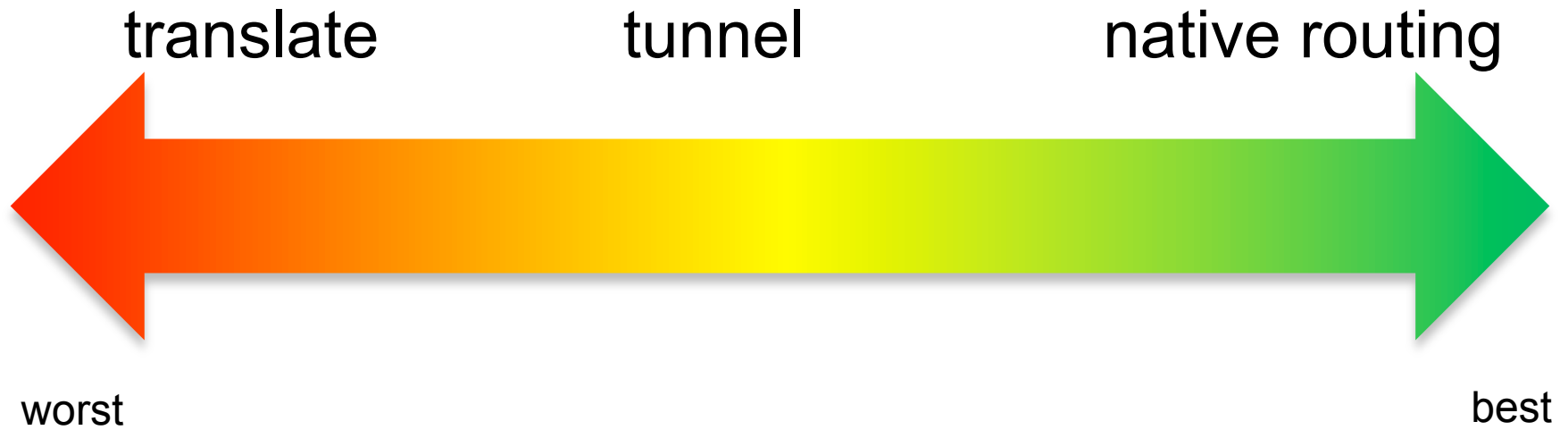


- NAT Purpose 2: connect IPv6 to IPv4

Connecting IPvX hosts to IPvY hosts

- NAT64 is not perfect
- IPv6 and IPv4 are not compatible
 - Fragmentation (IPv4: network fragments, IPv6: hosts fragment)
 - minimum MTU (IPv4: 576, IPv6: 1280)
 - IPv4 options versus IPv6 extensions
- Like NAT44:
 - NAT64 can also bring Application Layer Gateway (ALG) issues
 - Complicates troubleshooting and abuse handling

IPv6 Transition: Tunnel or Translate?



Conclusion

- IPv4 address sharing (NAT, A+P, other)
 - Necessary to keep business running
 - Necessary to keep users happy (long tail IPv4)
 - But is never ideal
- Native IPv6 > tunneling > NAT
- Focus on mechanisms that move towards IPv6
- Simple to operate
- Stateless