

# IPv4 as a Strategy

or how address shortage will provide  
control over services again



# Consultants

Because Meat and Malbec is simply not enough



# Services generate value

- Users do not care about the network, they care about services
  - voice, games, music, movies, and other entertainment
  - self-ordering fridges, automotive intelligence, and other device2device or device2human interaction



# Prior to the Internet

- Telecom operators provided the services and controlled the value chain and its revenue
  - high stability, high margins, stockholder value
  - successful innovations: telephony, fax, minitel, 800 and 900 number based services



# Internet is a virus?!

- Internet caught us by surprise:
  - Customers connected to Internet Service Providers via modems over telephony infrastructure
  - Applications where offered without our permission
- Turned the intelligent telephony network into a dumb transport service



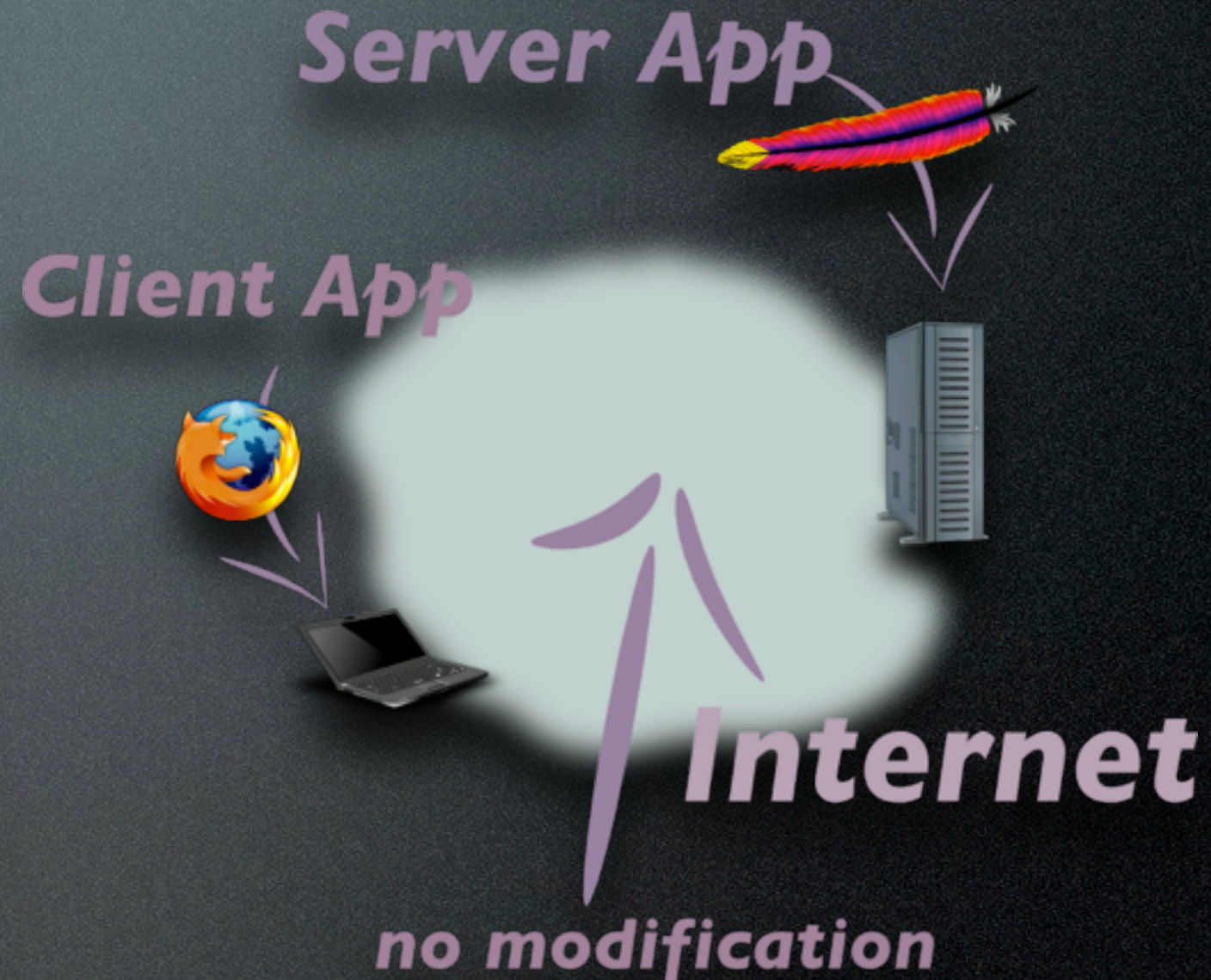
# Connectivity vs. Service

- Providing television, internet and voice over the same infrastructure provides some value added revenue
- But content is provided more and more by Internet Services
  - Telephony moves to voip (Skype)
  - Television moves to YouTube



# Why did this work?

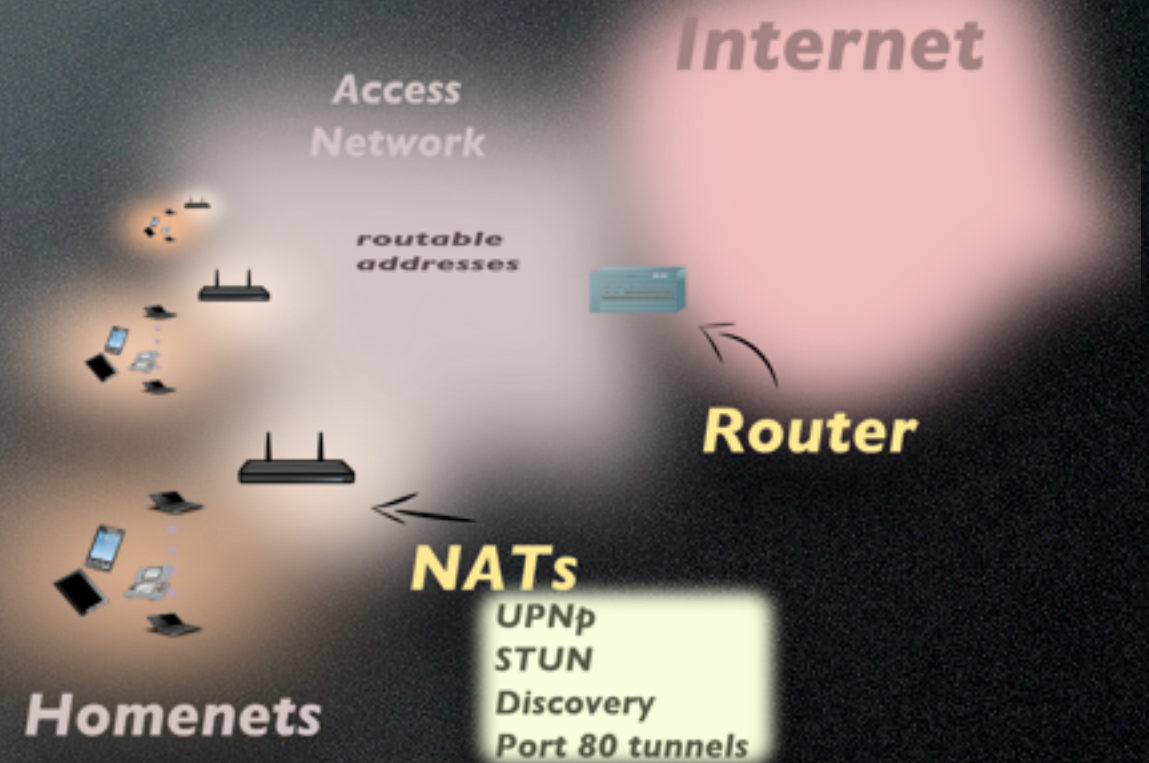
- The open end-to-end model:
  - Network Layer and Application Layer evolved independently
  - Connected devices could interact without changes to the network





# Breaking Openness

- Internet depended on the endless supply of free IP addresses
- Resources are not free:
  - People did not pay for additional addresses
  - rational economic behavior forces intelligence towards the core
- Imagine what we could have done when we had monetized on NATs from the start

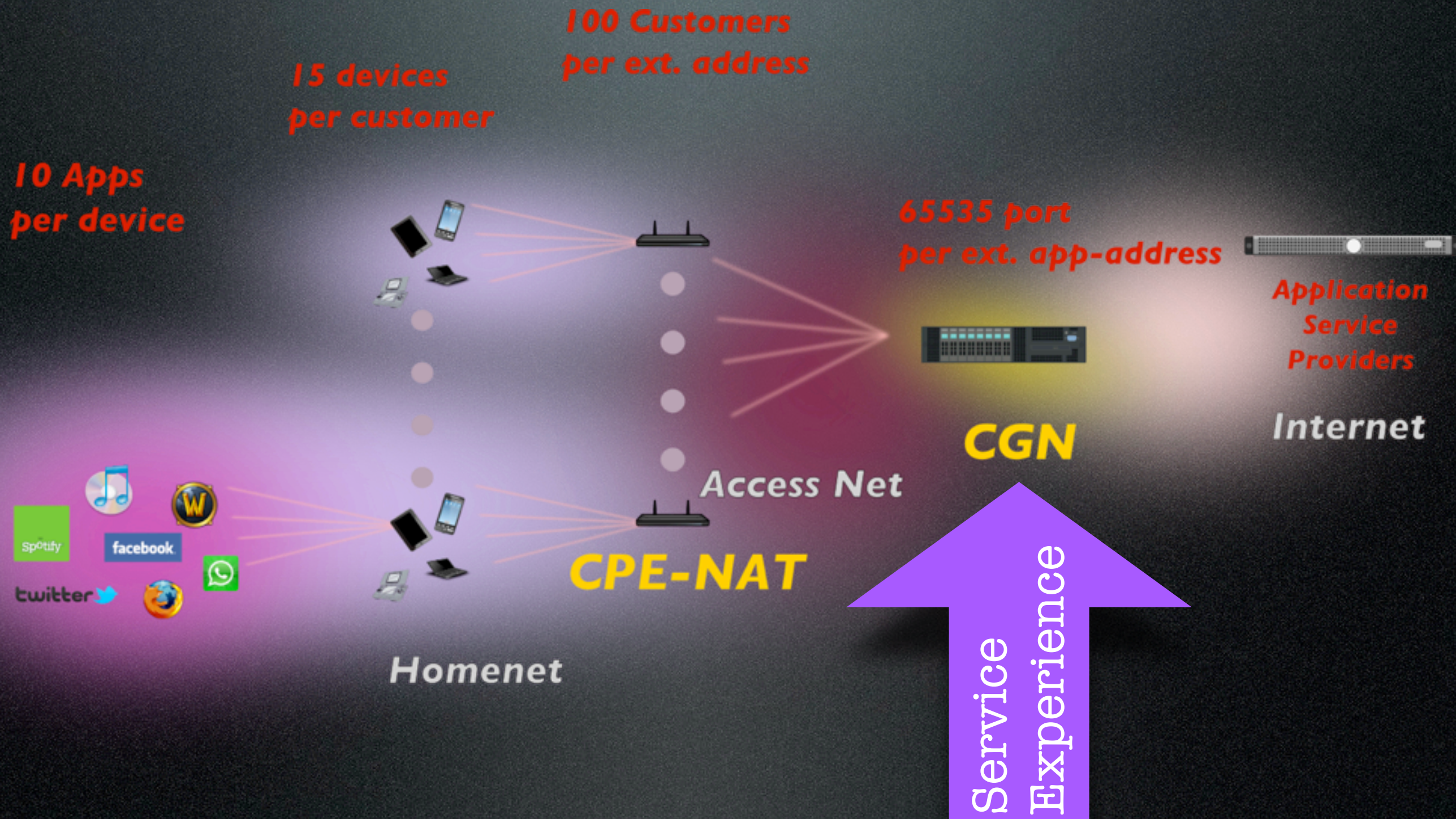




# Why is IPv4 Shortage Good For Us?

- Allows us to introduce an additional control point through which we can gain control over the services
  - End user hosts will not be able to connect to the Internet directly
- Technology called Carrier Grade NAT (CGN)



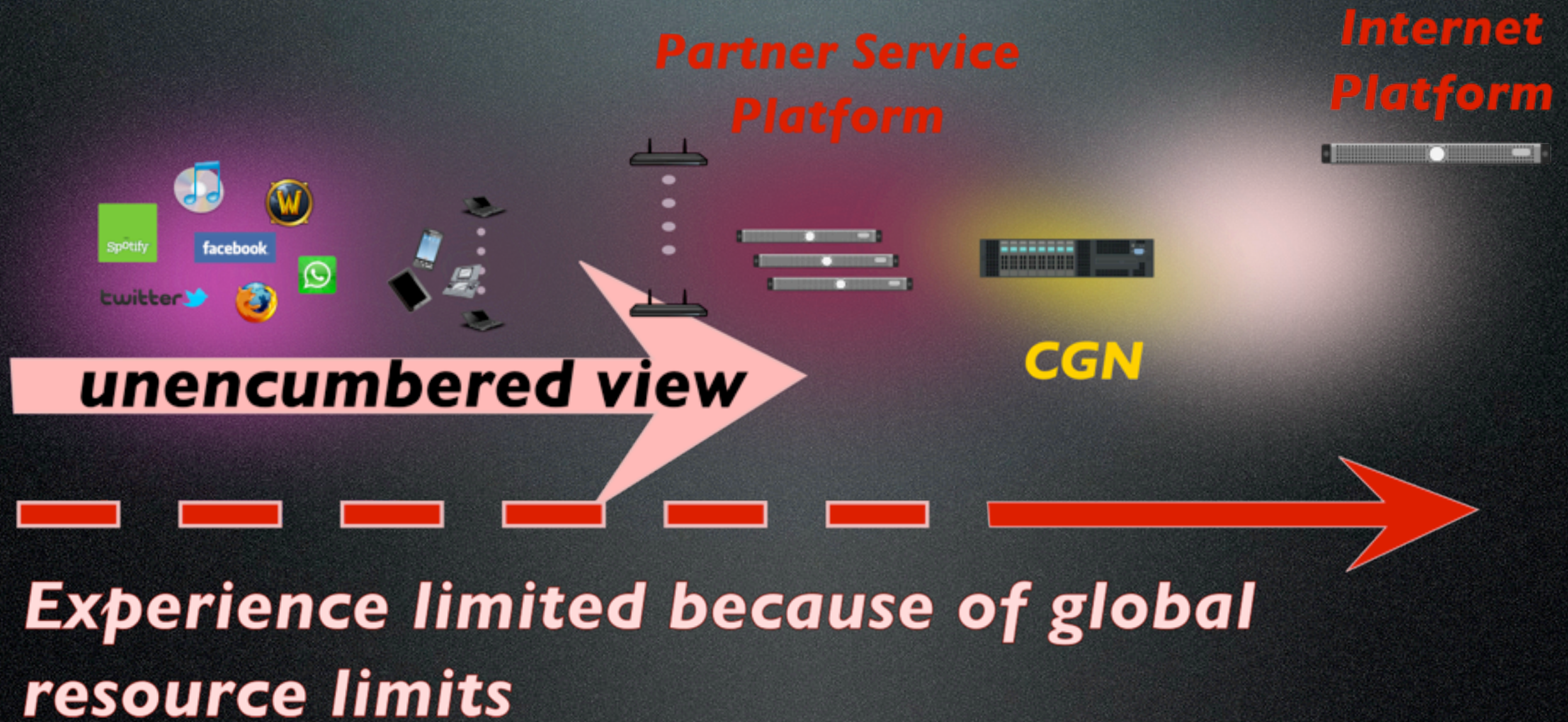




# Properties of Carrier NAT Architecture

- Turns one limited resource (addresses) into another (ports)
- We can relate the number of ports a customer has available to services
- Results in the possibility of tiered services and variable billing







# In addition

- Some services are extremely difficult to operate over NAT.  
e.g.:
  - Voice over IP (SKYPE)
  - Bit Torrent
  - Running services



# The result

- Incentive for Application Service Providers to partner with us
  - Guaranteed Quality of Service
  - Revenue sharing to keep CGN and network up to par with their needs



# Risks

- Potential Regulatory Pressure
  - IPv4 for new entrants
  - Net Neutrality
  - IPv6 ‘as public good’



# IPv4 and new entrants

- IPv4 is a scarce resource: 2012 no IPv4 available from the RIRs
  - Market Entrance is a regulatory concern
- We will return IPv4 addresses
  - Goodwill with regulators
  - We'll be moving to CGNs anyway



# Net Neutrality

- The CGN based architecture cannot be neutral any longer because the address-scarcity cannot be fixed by investments or market competition
  - External services move inside our network
  - or only have limited ports: bad user experience



# IPv6 trials

- Offering IPv6 leads to failure:
  - No application and CPE support
  - Worse user experience: customers will allow us to stay conservative and slowly move to CNGs
- Expensive to participate in
  - But a demonstration of good will



# Conclusion

- IPv4 based CGNs to cope with address exhaustion as a positive long term incentive
- CGNs will allow us to generate revenue from services again



# Thank You!



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