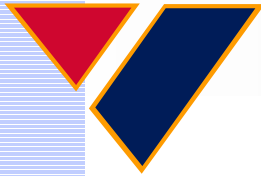


SPAWAR



Systems Center
Charleston

The Case for IPv6 in Online Gaming

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Background

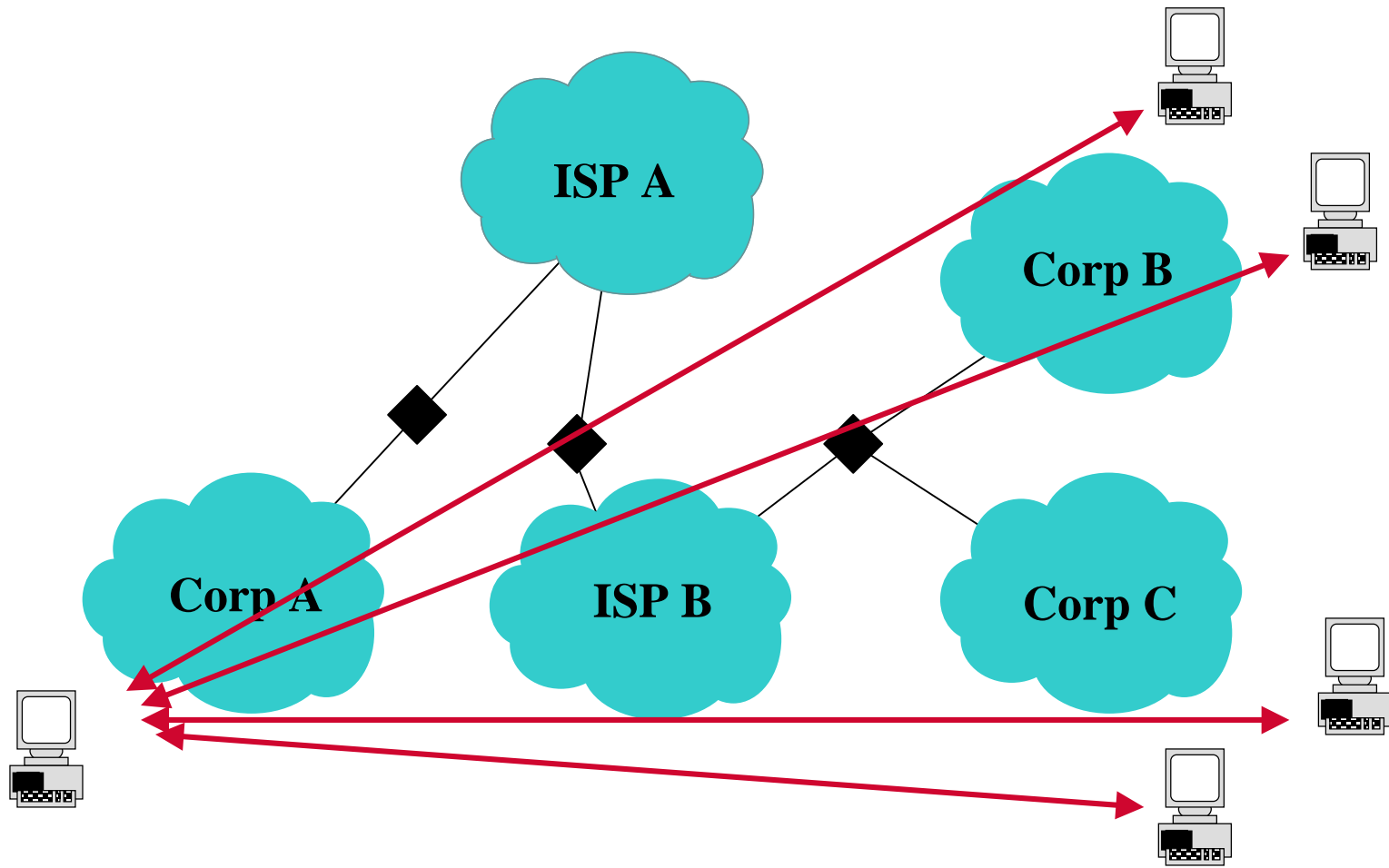
- Online gaming is a broad category of applications.
 - Quake
 - Doom
 - eCasinos
 - eLotteries
 - and many many more....
- Online gaming is a rapidly growing market.
- United States gaming market is currently valued at \$10 billion dollars
- 2.5 million Americans currently use the Internet for online gaming.

Gaming Market Restricted

- Most online games today are principally client-server in nature for many reasons including IPv4 address depletion/conservation.
- IPv4 Internet can't satisfy one or more of the requirements of many online gaming applications.
- IPv4 address depletion/conservation and related issues tend to increase the cost and complexity of developing, testing, deploying, and supporting innovative new online gaming applications.
- IPv4 Internet limits the size of the online gaming market because of its well known limitations on scalability and accessibility.

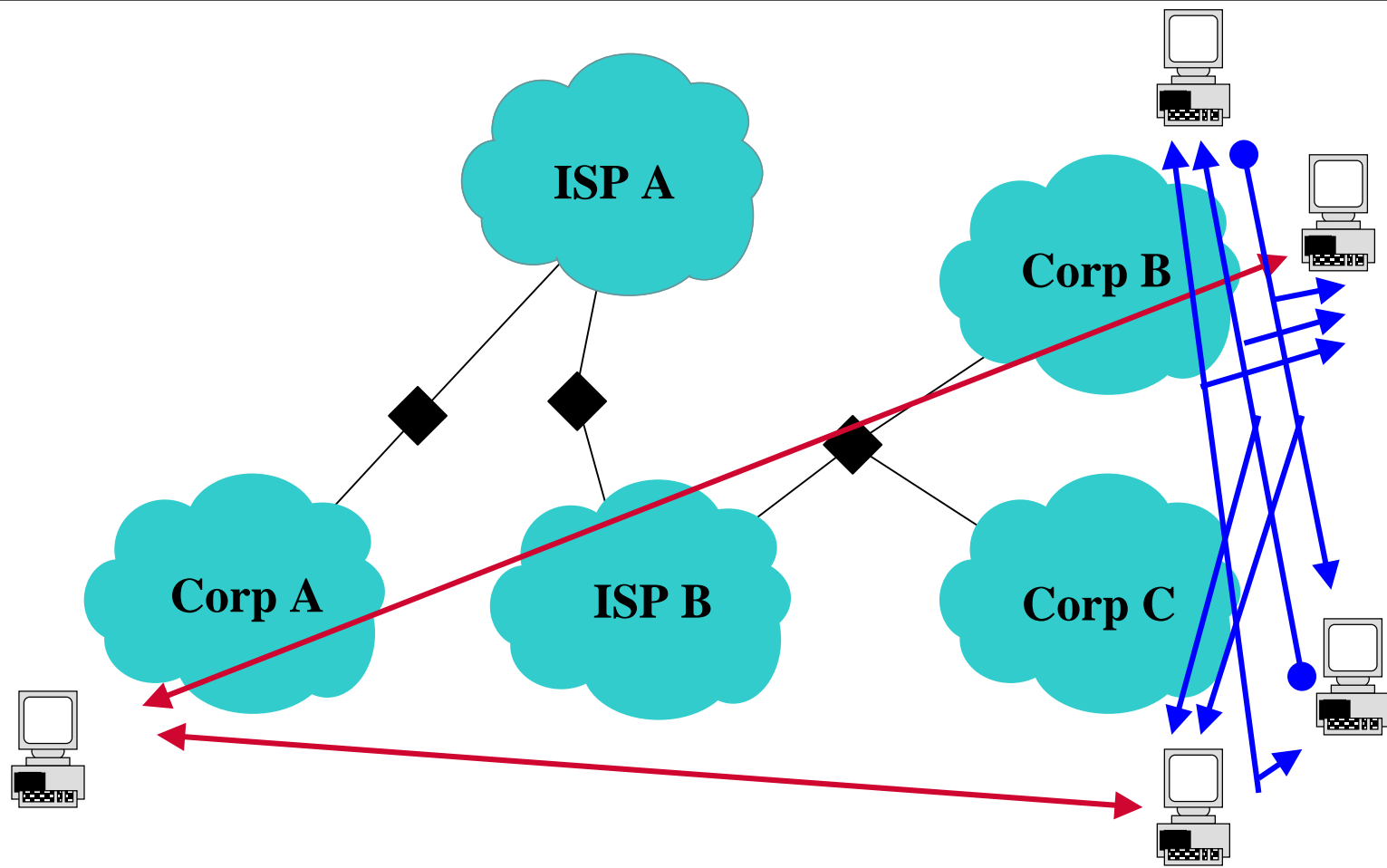
Current Online Gaming Model

(Principally Client-Server)



Future Online Gaming Model

(Peer-to-Peer with some Client-Server and Mobile)



Business Requirements Online Gaming

- Online gaming products and services must be able to utilize the ***full peer-to-peer capabilities of TCP/IP***.
- Online gaming products and services must ***scale to many geographically distributed players***.
- Online gaming products and services must be able to ***use and incorporate non-gaming products and services***.
- Online gaming products and services must have access to ***strong security mechanisms*** for authentication, data privacy, and payment.
- Online gaming products and services must support both ***fixed and mobile*** Internet gaming devices.

Business Recommendations

Online Gaming

- Online gaming products and services should be ***cost-effective*** to develop, test, deploy, and maintain.
- Online gaming products and services should be ***affordable*** to the vast majority of Internet users.
- Online gaming products and services should require ***little or no user configuration*** to effectively use.
- Online gaming products and services should utilize ***open industry standards*** to the greatest extent possible for extensibility.

IPv6, a Business Solution for Future Online Gaming

IPv6 could bring about an explosion in the online gaming market by:

- Connecting every human.
- Anywhere.
- Fixed and or Mobile.
- With efficient and scaleable transport services.

IPv6 could support cost-effective:

- Porting of existing online gaming applications.
- Development of new and innovative online gaming applications.
- Application testing, deployment, and maintenance.

IPv6 could provide robust and flexible security mechanisms when required.

Technical Requirements

Online Gaming

- Online gaming products and services must be able to utilize the *full peer-to-peer capabilities of TCP/IP*.
- Online gaming products and services must possess *real-time performance* (typically <100 ms) where necessary to satisfy human perception or where required by the gaming application.
- Online gaming products and services must *efficiently distribute information* to all game players.
- Online gaming products and services must have access to *strong security mechanisms* for authentication and data privacy.
- Online gaming products and services must utilize *QoS and or resource reservation* when real-time performance is required by the gaming application.
- Online gaming services must possess *low packet loss* (typically <2%) when required by the gaming application.
- Online services must possess *low packet jitter* when required by the gaming application.

IPv6, a Technical Solution for Future Online Gaming

- All the technical requirements for future online gaming can be satisfied, in the general case, with *the use of IPv6, IPsec, broadband, and with good design and management of gaming infrastructure and resources.*
- The technical requirements for future online gaming cannot be satisfied, again in the general case, with the use of IPv4 or even a transitional IPv4/IPv6 gaming infrastructure. Protocol Translators, NATS, proxies, firewalls and other such “inline” devices will typically violate one or more of the technical requirements and add single points of failure, performance bottlenecks, and complexity.

Other Considerations

Standards for interoperable online gaming already exist. Industry should examine the existing standards from SISO and IEEE to determine their usefulness. Industry should also engage in future standards development.

- Simulation Interoperability Standardization Organization (SISO)
<http://www.sisostd.org/content.htm>
- Institute of Electrical and Electronics Engineers (IEEE)
<http://www.ieee.org>

In addition, online gaming products and services could provide an excellent integrated means for users of the IPv6 Internet to access all Internet services including email and the WWW. Existing and future markets would thus become available to vendors of online gaming products and services.