Final Fantasy XIV:

Packets

* Max size 0xFFFF
* Uses TCP
* Uses subpackets combined into one base packet
* Base packets are containers for subpackets, containing a number of subpackets that need to be processed. Makes use of a 0x10 byte header.
* Base packet Format:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8, 9, A, B, C, E, F |
| Authentication | Compression/ encoding | Connection Type | | Packet Size | | Num of Subpackets | | Timestamp (milliseconds) |

* + Authenciation check. Should always be set to 1, except the initial packet.
  + Compression/encoding check. Checks if client is communicating with lobby or map servers.
  + Connection Type. Set to 0x1 for zone connection, 0x2 for chat connection
  + Packet size: total size of packet, including header
  + Num of Subpackets: How many subpackets this main packet contains
  + Timestamp: Unix timestamp, in milliseconds.
* Many subpackets can be contained with a single base packet. Each one begins with a 0x10 byte header.
* Sub packet format:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C, D, E, F |
| Packet Size | | Type | | Source ID | | | | Target ID | | | | Unknown |

* + Packet size: the size of the subpacket, including header
  + Type: Defines what this packet does
    - 0x0: initial handshake
    - 0x2: Zone server related
    - 0x3: Game packet
    - 0x7: Zone server related
    - 0x8: Zone server related
  + Source ID: Actor that triggered the subpacket
  + Target ID: Actor this subpacket is for
  + Unknown: Unknown what this field does.
* Game packets are the 0x3 subpackets that the lobby and map server use to control the game. Largely unknown what the packets contain, with fields 2 and 3 having Opcode and 8 through B having the timestamp. 0 and 1 contain 0x14 while 4 through 7 contain 0x00, but their function is unknown.
  + Opcode: Defines what the game packet does
  + Timestamp: Current time in seconds

FFXIV latency is generally somewhat high for UK users. This is due to the datacentres locations, which the North American servers been on their west coast in California, and the European ones been located in Frankfurt, Germany. The Japanese and recently added Oceania servers are even further away, and naturally suffer from an even higher ping. Some years ago, both European and American servers were contained in Canada, causing a variety of issues for European players, that now thankfully has been resolved.

The version control handled here is simple: If your client is not up to date, you can not even log in to the server.

FFXIV supports cross-platform play between PC, Mac, PS4 and PS5. It functions on Linux, but with some issues and config required. Players over all platforms share the same servers, and interact with each other. It formerly also supported PS3, but that support was dropped on June 16th, 2017. To facilitate in game communication, the PS4 and PS5 versions support the use of a keyboard and mouse. The game also has a quick phrase library that is extensive and also auto translates into a variety of languages to allow people from all over the world to play together with minimal barriers.

FFXIV is a roleplaying game (RPG) and that influences what is prioritised when determining what goes into the packets. This can often be seen with a disconnect between what is on screen and what actually happens, such as a massive fireball going off and still hitting a player who has left before the animation has played, due to been in its effect area when the ability triggered, rather than when its visuals fully appeared. Another example of this is “slide casting.” If a player attempts to move while casting an ability that has a cast bar, it will cancel the ability. Due to how frequently the server updates, it is possible to start moving shortly before a cast ends, causing your character to perform the ability and its animation while moving, causing a sliding lack effect. This has become so prevalent that even in demonstrations from the development team of new content, slide casting is utilised.

FFXIV uses a central server for security and ease of roll out and maintenance.

Like many online games, FFXIV is a frequent victim of DDOS attacks, as well as various forms of hacking attempt, such as trying to steal customer data, gain access to players accounts fraudulently, and has a frequent botting problem. Square attempts to resolve these botting problems in large waves, rather than going after bots the moment they are reported. The game also has two factor authentication, with an added in game incentive of an extra “favoured destination” in game, which lowers the cost of teleportation when going to that destination, the games method of fast travel.

Encryption

FFXIV uses HTTPS encryption for its launcher, which sends the login information. Game traffic is not encrypted.

Thread usage

FFXIv uses as many cores as are available, using multithreading and doesn’t set thread affinities. It uses 64-bit and no longer supports 32-bit. OS determines with core the games threads use.

Memory usage

FFXIV recommends 4GB or more of Memory (RAM). For storage, it varies by platform. PS4 and PS5 required 60GB free, while Windows and Mac required 80GB or more.

Graphical requirements

On PS4, the game supports two preset modes, performance and quality, with performance favouring higher framerates and quality providing better visuals.

On PC, the game requires at least a GTX750/R7 260X or higher, with a GTX970 or RX 480 recommended. It requires at least a 720P display, with 1080P recommended. The game uses DirectX 11 exclusively.

Fortnite:

Packets:

Latency: Fortnite has Servers spread out around the world. Two in NA (west and east), and one apiece in Europe, Oceania, Brazil, Asia and the Middle East. Fortnite runs on a variety of platforms and as a shooter, requires a fairly low ping to ensure proper hit detection when shooting.

Version control: Like most online games, Fortnite will first check the files are up to date when trying to log in, and if not, will not allow the player to access the game modes until the update has been performed.

Cross-play: Fortnite supports crossplay between most platforms, with Playstation, Xbox, Nintendo, Mobile and PC gamers all able to play together. For android players to play with other platforms, they must join a crossplay party first. Due to legal troubles, IOS and mac players cannot currently play with other platforms. Progress is also shared should you link your epic account.

Genre: Fortnite is a third person shooter battle royale. As such, it requires the game to be responsive, and its competitive gameplay means that ensuring a level playing field between varying internet connections and devices can be quite difficult. Looking at popular forums, such as GameFAQs, ResetEra and Reddit provides many complaints about the games hit detection not been up to par.

Server: Fortnite uses a central server, much like most online games.

Security: As with any online game, Fortnite is vulnerable to the ever popular DDOS attack. However, very few of these attacks appear to have been reported if/when they have occurred. Phishing scams to attempt and steal customer information are not uncommon, and as the game uses a virtual currency (V-bucks) there are many attempts to scam people with claims of cheaper v-bucks purchases.

Encryption: Fortnite makes use of AES encryption keys. These keys are frequently datamined and figured out by users, to the point Epic has requested that dataminers using them not to leak encrypted content. ( <https://www.parisbeacon.com/37927/> )

Fortnite does make use of multiple cores, but does not distribute the load evenly. It does however have little variation in performance than a six core vs a two-core, ensuring it can be used on lower end CPUs. ( <https://www.tomshardware.com/uk/reviews/fortnite-best-performance-benchmarks,5541-6.html> )

Fortnite requires a minimum of 4GB of RAM and 16GB of free space. It is however recommended to have 8GB of RAM. The game is not highly demanding, as it needs to be able to run on a wide variety of devices, including lower end phones. This holds true for the graphics requirements as well, with it able to run on an Intel HD 4000 at minimum, though recommending a GTX 660/ HD 7870. For laptop uses, this shifts a bit, requiring Intel UHD onboard graphics, or Radeon Vega 6 at the very least, and recommended the RTX 2060 Max-Q / 5600M. In all situations, it requires DX11.

Apex

Packets: Apex splits its packets, and appears to have high packet loss. To aid players in spotting this, the game displays the amount of packet loss they suffer, as well as packet choke. In 2011, EA did an article on their packet loss, claiming the hardware that connected players to the server had a flaw causing massive packet loss. They go on to explain that a lot of the problems with this are not the players, nor EA’s, but the individual ISPs. ( <https://www.ea.com/en-gb/games/apex-legends/news/servers-netcode-developer-deep-dive> )

Latency: To help keep latency low, Apex L:egends has servers in many locations. As per a graphic by Netduma, from January 2022, they have datacentres in 10 locations spread of the United States, 1 in the UK, 3 on the European mainland, 1 in the middle east, 4 throughout Asia, 1 in Oceania and 1 in south America. ( <https://netduma.com/blog/apex-legends-server-locations/> )

Version control: As with Fortnite and FFXIV, people with the wrong version cannot even access the game until the files are validated as up to date.

Cross-play: Apex Legends has crossplay over PC (steam and origin), Playstation, Xbox and Switch. It does not however support cross progression except between Steam and Origin. An alternate version, Apex Legends Mobile, also exists, but does not provide crossplay or progression at this time.

Genre: Apex Legends is a first person shooter, battle royale. Much like fortnite, this requires it to be responsive, as its competitive gameplay will require a level playing field even if players with higher hardware and faster connections get coupled with those on lower end technology.

Server: Apex legends uses central servers to handle gameplay. All players are required to connect to one of these servers to play.

Security: Apex Legends has suffered many attacks over its time. It makes use of easy anti-cheat to try and prevent hackers from altering the game. This software can be overly aggressive, and has prevented players from accessing the game due to things such as RGB software. (<https://answers.ea.com/t5/Technical-Issues/Easy-Anti-Cheat-game-security-violation-detected-000000D/td-p/7825729> )

Its biggest security issue came in the form of a massive, long term DDOS attack due to players disgruntled with the situation surrounding Titanfall 1 and 2, but many others have occurred since, the most recent reported in January of this year. ( <https://www.dexerto.com/apex-legends/apex-legends-pros-streamers-cant-play-the-game-due-to-constant-ddos-attacks-1739575/> )

For players, it does offer 2 factor authentication, one of the most secure forms of protection.

Encryption: Unfortunately, I was unable to acquire information on what forms of encryption Apex uses.

Thread usage: Apex Legends appears to make very good use of multiple cores. It also offers hyper-threading.

Memory and graphics usage: At a minimum, the game requires 6GB of RAM and 40GB of storage to even run, with 8GB or more RAM recommended. For graphics, it requires a card that has at least 1GB of GPU RAM, with a GT 640 or HD 7730 listed as the minimum required cards. It recommends a GTX 970 or R9 290, with 8GB of GPU RAM

Data set 1

FFXIV – 36ms average

Fortnite – 26ms average

Apex - 18ms average