PIKKOTEKK

TANKS VS. ROBOTS
IN NUMBERS
MARCH 2011

» TANKS VS. ROBOTS IN NUMBERS

The purpose of the world record game Tanks vs. Robots is to show the real power of the Pikko Server product. By using Pikko Server, it is possible for game developers to build any kind of high player density MMO game. To prove this, we have built an example MMO FPS, which, when running, gives the numbers shown in table 1.

» Table 1: Tanks vs. Robots in numbers	
Number of players	1000
Number of cell servers	8 (built using the Unity Engine. Every game server is responsible for 125 avatars).
Total bandwidth downstream per player	112 kbit/s
Actions per second sent from clients (mean)	11 (10 movements + 1 fire)
UDP packet rate from server (mean)	36,000 packets/s
World state snapshots per second, sent to all clients[1]	15 (for the 125 avatars closest to your avatar) 3 (for the other 875 avatars)

» Table 1: Tanks vs. Robots in numbers	
Size of the server-side state for one player[2]	3000 Bytes
Downstream UDP packet size for world state snapshots	11.6 kBytes
Number of handovers per second (mean)[3]	35
Cell server ticks per second[4]	60
Busy-sleep time per tick in cell server[5]	10 ms
Round-trip latency addition when using Pikko Server compared to a identical setup without Pikko Server (mean)	20 ms (when using a gigabit LAN between Pikko Server and the cell servers) 10 ms (when all are hosted on the same machine)

» HOSTING ENVIRONMENT

The server side is hosted by Game Hosting GH AB. This partner company is the perfect choice for hosting game server with low latency demands, low packet loss and high availability. The datacenter is directly connected to one of the big Internet fiber backbones in Europe.

---

[1] Includes for example the position, rotation and velocity for all avatars in one game server.
[2] This game only needs a few bytes for position, rotation and team. The rest of the bytes are garbage data, just to prove that our technology works with realistic server side states.
[3] Handover means transferring an avatar from one cell server to another through Pikko Server. This number depends on player density and movement patterns. The number is proportional to the square root of player density.
[4] This is a high tick-rate, but good for this kind of fast-paced FPS game, because it makes the latency lower.
[5] Because the cell servers have very little game logic, 10 ms busy-sleep was added to prove that customers can use more demanding game logic calculations. This could include security checks, physics, game logic, AI, persistence and more. Note that the time between game ticks is about 16 ms.

Pikko Server is hosted on a 2 CPU Linux server with a total of 8 cores (2 Intel Xeon E5430 processors). The eight Unity game servers are hosted on a 2 CPU Windows server with a total of 8 cores (2 Intel Xeon E5430 processors). They are connected to each other and to a Juniper firewall/router on a Gigabit LAN. The Juniper switch is directly connected to the fiber backbone. This is an ideal hosting environment for customers using Pikko Server. Table 2 shows typical hosting runtime load for the game.

›› Table 2: Hosting runtime load	
CPU load for Linux server	50%
CPU load for Windows server	65-70% (60% of the load is busy-sleep)
Round trip latency (median)[7]	30 ms.

›› FURTHER INFORMATION

Please contact us or Game Hosting GH AB to get more information about hosting massive game servers. We are happy to answer any and all questions you might have.

›› CEO - Christian Lönnholm
christian.lonnholm@pikkotekk.com
+46 - 733 99 38 44

›› CTO - David Almroth
david.almroth@pikkotekk.com
+46 - 70 417 46 10

›› Website
http://www.pikkotekk.com/worldrecord/

[6] Measured as the time it takes for a game client to send an RPC message to a game server and get a response, when 1000 players are online. Measured from a third hardware with a game client running in the datacenter.