

Appendix E. Description of algorithms of work of Server of the results

The main principles of functioning of Server of the results and the following important mechanisms of data exchange between Global Information System Fencing Competitions nodes are described in this article:

- Mechanism of distribution of data about the condition of the bout on the piste in real time mode,
- Mechanism of distribution of the data about the condition of the competitions,
- Mechanism of providing of the pictures with the photos of the athletes and the flags,
- Mechanism of providing of the other multimedia information.

Server of the results is the only node of Global Information System Fencing Competitions providing the connection between the nodes of green and yellow levels. Its main function is providing the information about the bouts in real time mode to the nodes of yellow level. Any producer of the hardware-software can create its own information system and having connected to Server of the results receive information about the competitions in real time mode.

Server of the results includes 3 modules:

- **Commands control module**– receives and processes commands from Global Information System Fencing Competitions nodes,
- **HTTP-server**– is a free access to the nodes and files (read-only) containing photos of the athletes, flags of the countries and clubs, XML data with the current condition of the competitions, e.t.c.
- **FTP-сервер** – is a Management fencing competitions system mechanism of uploading of the files which the node will be able to receive with the use of HTTP server.

Later, all the principles and mechanisms of functioning are described with the use of abstract commands, described in **Appendix B. Abstract commands**.

1.Startup and connections

For all the nodes of Global Information System Fencing Competitions the general rule is acting: each node must be self-sufficient and independent. This rule must be treated in the following way:

Let the node A must receive an information from the node B, if during the start the node A does not find the node B, the following rules must be complied::

- **(independence)** The node A must be launched and continue the trials to get connection with the node B till the moment when either the connection will be found or the node will be forcibly switched off.
- **(sufficiency)** the node A must fulfill all the functions which it can perform without getting the information from the node B

I.e. it is forbidden when the node A cannot get connection with the node B and stops its work.

e.g. During the launch Master did not find Scoring machines Server but in the same time Additional device tries to connect to Master. In that case Master must find the connection with Additional device and start to send information to it about its time, score, condition of the lamps e.t.c (i.e. everything except for the last names of the participants, phase of the competition and other information which it gets from Scoring machines Server).

Server of the results startup and connections

During the start up of Server of the results completes three processes¹:

- Start of the commands control module,
- Start of the HTTP server,
- Start of the FTP server,

Start of the commands control Module consists in connection of the network and expecting from Scoring machines Server or the Manager of the command node type.

Start of the HTTP FTP servers must be carried out according to a certain order defined by the producer of these servers.

Server of the results is considered to be fully started only if case of successful ending of all tree procedures.

Client startup and connections

Client is considered to be any node which connects to Server of the results to receive commands from it with the current condition on the pistes (INFO, TEAM e.t.c). As a rule, the Client node for Server of the results are the nodes of Yellow level.

In order to get the information about the condition of the bouts on the piste any node (further Client) must complete the following connection procedure:

Client forms HELLO command with the code of the piste from which he wants to receive information or ALL if the information from all the pistes is needed.

¹ Execution order is no matter.

Then Client sends the formed HELLO command every 4 seconds to Server of the results and expects INFO command from server in reply.

If the response INFO command from Server of the results has not been received in 2 seconds it means that there is no connection and it is lost. The order of the process of the present situation is defined by the Client producer.

Server of the results having received HELLO command from Client processes it in two stages:

First, it checks if there is a Client in a list of the connected clients.

If not (it is a new node) it remembers it. If there is such a node in the memory, the Server points time of the next command.

Then, if there is a code of the piste in HELLO Command but Server of the results with the present piste has not received any INFO command Server of the results sends empty INFO Command² to Client node. If the INFO commands were received from the indicated piste, Server of the results sends the last received INFO command from the present piste.

If ALL parameter is indicated in HELLO command, i.e. the node wants to receive the information from all the pistes, Server of the results sends the last received INFO command³. If Server of the results has not yet received any INFO command from Scoring machines Server from no pistes it sends empty INFO command.

If Client sends HELLO command to server and does not receive INFO command in reply, it means there is no connection. The order of processing of the present situation is defined by the Client's producer by itself.

If Server of the results does not receive HELLO command from any connected to it Clients for more than 63 seconds it means the connection with it is lost and is not reestablished. In this case Server of the results deletes the record about this node from the memory and does not resend any commands to it later.

² A type of the empty INFO command is defined by the specific protocol (e.g. in Cyrano 2.0 – it is INFO command with the single parameter |EFP2|INFO|EMPTY|).

³ The last by time

2. The main mechanisms of interaction of the nodes.

Mechanism of data distribution of the condition of the bout on the piste.

The used commands: INFO, TEAM, REPLACE, BROKEN

After Server of the results finishes startup it starts to receive INFO, TEAM, REPLACE, BROKEN commands from Scoring Machines Server from different pistes. Having received any command, Server of the results automatically resends it to all the connected to it Client nodes, having mentioned the present piste or ALL as a connection parameter.

Server of the results must remember the last received INFO command from every piste and TEAM command for left and right sides.

Mechanism of distribution of data about the condition of the competitions.

The used commands: UPDATED

The information about the current condition of the competitions is kept in XML format files, formed according to FIE rules (further – XML file). In one file – the information about the one competition according to FIE format.

In this case the attribute values «REF⁴» and «Nation⁵» must coincides with the certain field «ID of the athlete» and «Country code» of DISP commands.

Forms the present files Management fencing competitions system.

Forming (updating) of the files is carried out every time time when there is a change during the condition of the competitions:

- Approval or changing of the starting list of the athletes,
- Approval or changing of the starting classification,
- Approval or changing of the composition of the groups,
- Input of the protocol of all the bouts in one group
- Input of the protocols of all the groups,
- Approval or changing of the results of the group round
- Approval or changing of the classification after the group round,
- Forming or changing of the table⁶ or the full table,
- Input of the result of the bout to the table,
- Approval or changing of the final classification.

Every time when Management fencing competitions system forms new XML file with the data of the competitions, one of the Manager nodes connects to Server of the results using FTP and uploads the formed file to an appropriate folder.

Manager after a successful uploading of XML file sends UPDATED command to Server of the results with a certain kind of weapon of the competitions.

Server of the results, having received UPDATED command resends it to all the connected to it Clients.

Client, having received the UPDATED command or in any moment when it needs it, can address to HTTP server and download the needed XML-file.

⁴ An attribute contains a unique ID of the athlete, referee, team, e.t.c.

⁵ An attribute contains a country code

⁶ Information about all the bouts must be entered to the table. Even when the athletes has no competitor, automatically he goes to the next round. In this case, REF="0". Must be mentioned as a competitor.

Mechanism of confirmation of the received UPDATED command by the node-receiver can be provided by the protocol, implementing the interaction between the nodes.

Mechanism of providing of the images with the athletes' photos and flags.

Management fencing competitions system is responsible for gathering and providing of the images with the photos and flags. Mechanism of providing of the images with photos of the athletes and flags consists of two parts.

Upload of the information

Before the beginning of the competitions Manager forms files with the photos of the athletes and flags of the countries and uploads them according to FTP protocol to the certain folders to the Server of the results⁷.

In this case the files with the photos of the athletes must conform with the requirements:

File's format– JPEG,

- Horizontal resolution not less than 250 and not more than 500 pixels,
- Name of the file must be equal to athlete's ID⁸,
- File resolution must be jpg(small letters).

Files with the country flag or club must conform to the requirements:

File's format– JPEG,

- Horizontal resolution not less than 250 and not more than 500 pixels,
- Name of the file must be equal to athlete's ID⁹,
- File resolution must be jpg(small letters).

Manager can complete an upload information operation during the competitions (e.g. to update athletes' photos or corrections of the errors).

Download of clients information

Any node, which knows URL file can address to http-server and download it using HTTP protocol.

URL file is formed from the path to the folder¹⁰ and the name of the file. The node can form the name of the file on the grounds of the parameters received from INFO command.

E.g. if in INFO command is mentioned 'athlete's ID' equal to 23, than 23.jpg – is the file's name with his photo.

Or, let in INFO command the 'RUS' country code is mentioned, what means the name of the file with the flag– RUS.jpg

Also the node can get the information about athletes' IDs and countries' codes from XML file with the current condition of competitions.

⁷ Structure of the folders and the order of connection according to see in FTP Appendix F. FTP and HTTP folders in the Server of the results

⁸ Equal to the used in DISP and INFO commands

⁹ Equal to the used in DISP and INFO commands

¹⁰ Structure of the folders HTTP see in Appendix F. FTP and HTTP folders in the Server of the results.

If Master or Additional device have a possibility to show the photos of the athletes and/or the flags of the countries/clubs they can, as the nodes of the Yellow level, download them according to HTTP protocol from Server of the results.

It is recommended to download the images every time before using them as there can be changes on the server.

Mechanism of providing with other multimedia information.

Mechanism of providing with other multimedia information is equal to the mechanism of providing with the images with the photos of the athletes and flags and consists of two parts: posting of the information on Server of the results and access to it using HTTP protocol.

The order of publication of the information and URL access to it is defined by the provider of Server of the results and published in info.html¹¹ file.

¹¹ See in Appendix F. FTP and HTTP folders in the Server of the results.