

## Introduction

In 2014 FIE introduced SEMI 1.0 standard, which describes a structure and principles of functioning of Global Information System Fencing Competition.

During the World Championships 2015 in Moscow technical tests of the decisions laid in SEMI 1.0 standard have been held and proved its accuracy and executability.

Nevertheless, SEMI 1.0 standard introduces new serious requirements to the information systems used at the big events. In this regard, and because of the large volume of Standard text, a number of producers faced with difficulties of its implementation in practice.

In order to help software and hardware producers, SEMI Commission and SEMI 1.0 standard producers have launched a special project on the website:

<http://www.puchkov.pro/SEMI>

Under this project, information letters with the detailed analysis of one or another SEMI 1.0 standard peculiarities, answers to the frequently asked questions and also innovative solutions which are brought up for discussion for their inclusion to the next versions of SEMI standard will be published regularly.

It is important to note that information letters can also contain special section «The SEMI commission officially» with rendering of one or another statements and also additional specifications of SEMI 1.0 standard. A content of the present sections should be considered as mandatory by SEMI Commission.

If you have any comments, questions and improvements, please, contact producer of SEMI 1.0 standard Andrey Puchkov ([Andrew.puchkov@gmail.com](mailto:Andrew.puchkov@gmail.com)).

## Network structure

SEMI 1.0 standard introduces hard division of network (also cable) structure by levels. In this regard, service companies had many questions concerning practice implementation of the present requirements. There is a variant of correct formation of the cable network of the competitions below.

One of the most important statement of the standard is that the competition local network is isolated i.e. any connection of competition network to the Internet network or to any other networks is forbidden. The network must be isolated at the cable level.

One more important statement of the Standard is a ban on the connection to the Internet any nodes located on Green or Yellow levels. For example, it is unacceptable when one computer on Green or Yellow level is connected via Ethernet to the competition network and via WIFI to the Internet. In this regard, producers of Management of fencing competition have many questions, who do not understand, for example, how fulfilling this requirement organize live-results to the Internet. This situation is analyzed in details in the section «Live results».

In order to meet all the requirements of the standard the cable network structure of the competitions must be divided into several zones:

- Green level
  - Servers and Management competition zone
  - Preliminary zone
  - Second color zone<sup>1</sup>
  - Color zone
  - Final zone<sup>2</sup>
- Yellow level
  - Referee room
  - Call Room
  - TV Zone
  - Weapon control zone
  - Accreditation zone
- Red Level
  - Live translations zone

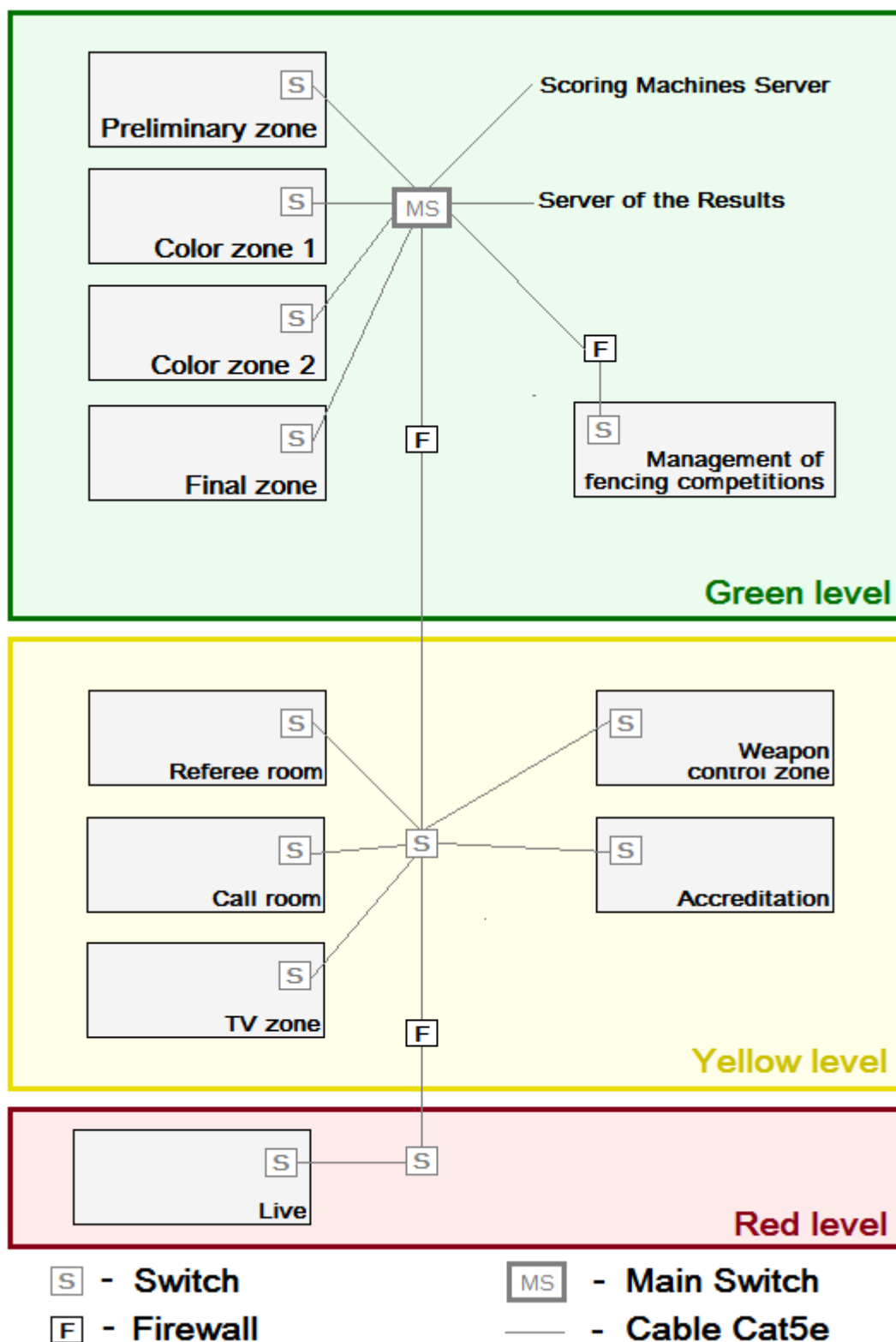
Switch, which must be in each zone, combines all the nodes of the zone. Besides, Main Switch must be located close to the Servers Zone (usually in Technical Directorate) to which all Switches and Servers are connected.

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<sup>1</sup> If two zones of the color pistes are used.

<sup>2</sup> Can be combined with Color zone, if they are located in the same place

For the detailed information see the scheme:



The present decision allows switching off that part of the competition network with failures. Or vice versa, to switch off all the zones besides the one where the bouts are held now. It is necessary to protect the process of the competitions from possible apparatus failures. Firewalls must be installed in the network to provide information safety of the Green level nodes. Firewalls must be located as follows:

- Between Green and Yellow level,
- Between Yellow and Red,
- Between Main switch and Management fencing competitions.

Any node of red level must be can be connected to the Internet but in compliance of two conditions:

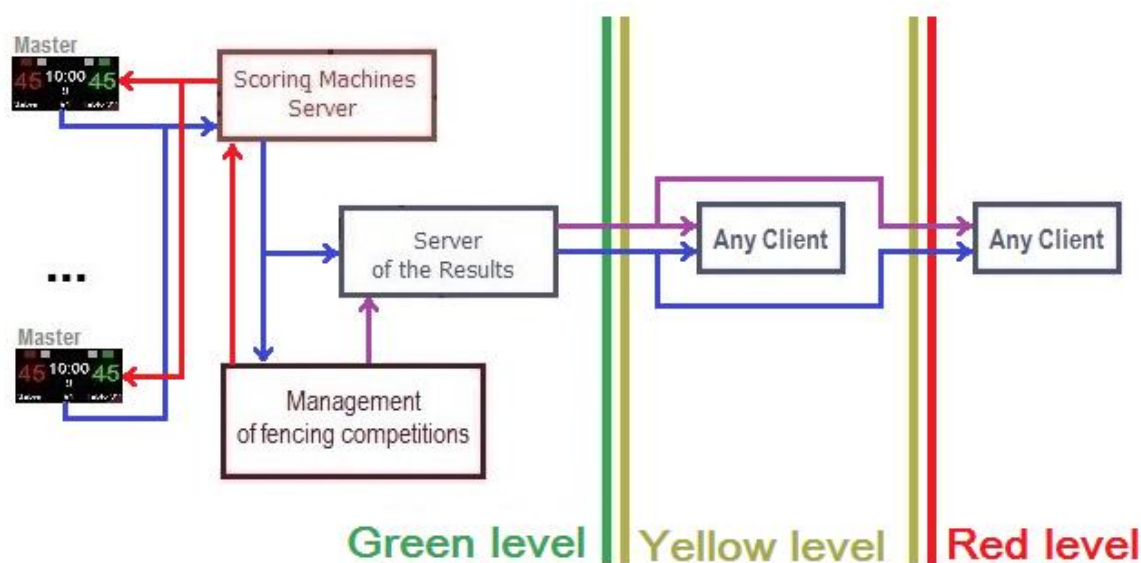
- The connection is performed with the use of separate network card (wifi or second Ethernet card);
- Antivirus package and program firewall must be installed on the node.

## Information streams

SEMI 1.0 standard introduced delimitation of the network nodes by the types and principles of interaction between them. Earlier, any network node could address to any other node and got answer from it, now there are restrictions to how the nodes must exchange with information among themselves.

All information exchange between the nodes consist of the following streams:

- Control stream,
- States stream,
- Update stream,
- Extended information stream



Direction	Stream	Commands
→	Control stream	DISP, TEAM, BOUTSTOP, MSG, STANDBY
→	States Stream	INFO, NEXT, PREV, REPLACE
→	Update stream	UPDATED

Control stream contains commands<sup>3</sup>, set the parameters of the upcoming bout on the piste, for example, DISP, TEAM, BOUTSTOP, MSG, STANDBY. The stream always starts on one of the Manager nodes and finishes on the Master node of the corresponding piste.

Piste States Stream contains commands describing the current condition of one piste, e.g., INFO, NEXT, PREV, REPLACE. It is important to note that the requests of the referee on the piste (request of the next or previous bout, substitution of the athlete in team competitions, e.t.c) are related to the present stream.

The stream starts on the Master node of any piste and is sent to the Scoring machines Server, where it is joined with other same streams and are sent to the

<sup>3</sup> Здесь и далее используются абстрактные команды. Подробнее перечень данных команд

Management of fencing competition nodes and Server of the results and then to all the nodes of yellow and red level.

Update stream contains the command UPDATED and informs nodes about changed condition of the competitions, i.e. xml-files have been updated with the competition data on Server of the results.

The stream starts at one of the Manager nodes, is sent to Server of the Results and then is retransmitted to all the nodes of yellow and red level.

It is important to remind that any node of yellow or red level in order to get States stream and Update stream data, must register on Server of client as a client. .

Extended information stream contains volumetric and complex structured data as photos of the athletes, pictures of the flags or clubs, xml-files with the current condition of the competitions e.t.c. All the similar data must be kept as filed data which are uploaded to the Server of the Results by FTP protocol.

Any network node can load any file with extended information from Server of the Results using HTTP protocol.

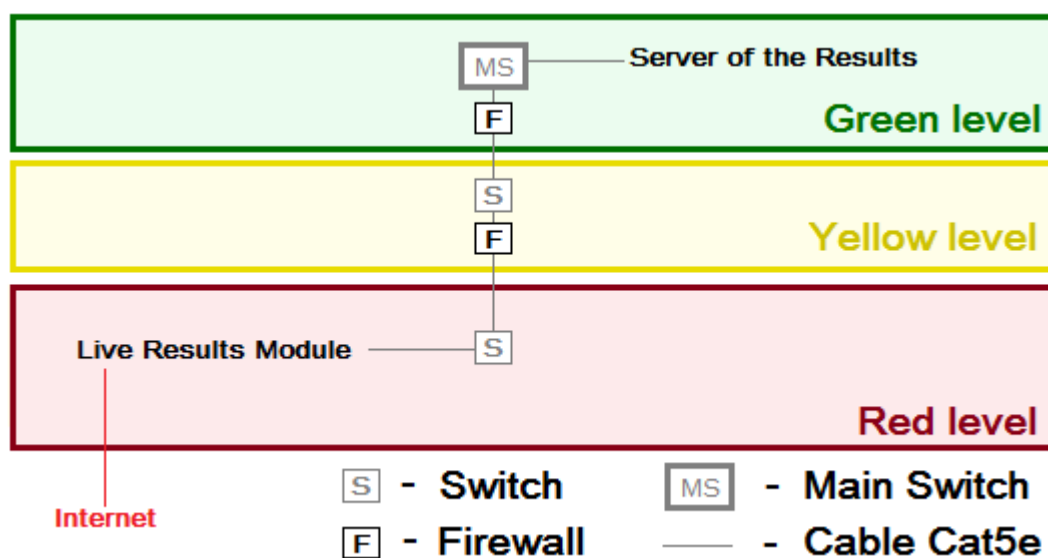
The list, file structure and files naming rules are described in SEMI 1.0 standard. The rules are arranged in such a way that any node, based on the data received from State stream can form file name with the requested extended information. For example, file name with the picture of Russian national flag (RUS) has a name RUS.jpg.

## Live results

A problem with organization of live results broadcasting on the Internet has provoked the biggest discussion. The main difficulty is that all competition results are kept in the nodes of Green level and the connection to the Internet is available only on Red level.

Almost all modern Management of fencing competition contain live results modules. Moreover, very often these modules are located on the same computer that competition database. Such decision endangers holding of the competitions and is unacceptable.

In order to meet all the requirements of SEMI 1.0 standard live-results module must be deleted from Management of fencing competition and must not be a part of its component part. The present module must be located on the Red level.



As any Red level node, live-results module has an access to Server of the Results and can register as client and get INFO commands from all the pistes through it. Thus. Live-results module gets information about the condition of the bouts on all the pistes in real-time mode.

On the other hand, live-results module can get extended information from Server of the Results through HTTP protocol: files with photos of the athletes, pictures of the flags and xml files with the current condition of the competitions.

Moreover, if it is necessary Management of fencing competition can place (through FTP protocol) any additional information to Server of the results which live-results module can get through HTTP protocol.

Thus, live-results module can get any necessary information in real-time mode from Server of the results node, process and upload it on the Internet. In this

regard all Green level nodes are inaccessible and unprotected from Internet attacks.

A breakdown of live-results module cannot interrupt the work of Green level nodes and influence on the run of the competitions.



## Standard SEMI 2.0. Network for small competitions

One of the most frequently asked question is how to organize the work of information system and competition network at small competitions as World cups or Cadet circuit. Minimum number of equipment is used at these competitions and meeting all the requirements of SEMI 1.0 standard is difficult to realize and expensive.

SEMI 2.0 standard must form a principle of organization of competition network for small competitions. The main principle of the new standard is that the used software must be used without changes.

The difference must be the in the number of the used computers and setting of the nodes.

Thus, while organizing networks for small competitions minimum two computers should be used:

- Scoring Machines Server (IP - 172.20.0.1)
- Server of the results (IP 172.20.0.8)

Hereafter, database of the competitions and control modules of Management of fencing competition must be placed only on the same computer Scoring Machines Server. It is unacceptable to place competition database on Server of the results.

The connection of computer Scoring Machines Server to the Internet is unacceptable.

The computer on which Server of the results is installed can be connected to the Internet. Live broadcasting mode can be launched on it.

All the requirements to interaction between the nodes, stated in SEMI 1.0 standard are without changes.

Thus, all software developed for big competitions and met with requirements of SEMI 1.0 standard can be used at small competitions without changes.