

Global Information System of Fencing Competitions (Standard SEMI 1.0)

Introduction

The Present Standard introduces the united principle of organization and interacting of all information systems used during the holding of fencing competitions

The use of the present standard guarantees the compatibility of the sub-systems of different manufactures what allows the Organizers of the competitions to choose the best products and join them in the global information system of the competitions.

The use of the global information system at the competitions opens the new opportunities in modern covering of the competitions. Spectators can have an access to the latest, statistic and historic information while being at the venue or in any part of the world. The nodes of Global Information system, their functions and interaction mechanisms are described in the present standard.

The formulated demands for configurations of the Global Information system fencing competitions, its settings and functioning in the present standard are obligatory for all the FIE competitions. The service companies, providing service at the competitions can use their own technologies and solutions in this sphere if the two conditions are fulfilled. Firstly, they have to provide steady work of all the nodes of a Green level (see below) Global Information system fencing competitions according to the demands of the present standard. Secondly, their applied technologies and solutions should not disturb the work of the unfolded Global Information system of fencing competitions according to the present standard. Secondly, their applied technologies and the decisions should not disturb the work according the present standard.

Terms and Definitions

Node – (system or device) Global Information System of Fencing Competitions

Master – The Main Apparatus on the piste

Master Status– the formal description of the current status of the bout which the apparatus keeps at each moment of the time. Master Status includes:

- Piste number;
- Weapon: epee, foil, sabre;
- Information about the participants (last names, country codes/regions/clubs e.t.c.);
- Bout scores;
- Status of the bout: no participants, non-activated, activated, finished;
- Status of the bout timer (time of the bout)
- Bout timer is on/off;
- Type of the timer value: bout; pause: medical pause;
- Duration of the round by default;
- The meaning of the lamps (colored and white ones)
- Cards: yellow, red, black;
- Meaning of the priority;

Number of the requested video replays by athlete/coach

Master Status can include additional information which is defined by the information/service opportunities of the apparatus and the protocols of their interaction.

Action on the piste – an action which leads to the changing of the Master Status. The list of the most important actions requiring a special processing is in Appendix C. Important events on the piste.

Slave – an additional apparatus or other device which repeats the actions on the piste for spectators (e.g, lamps repeaters or stands with score, remote timers). Slave connects to the Master and receives all the information about the events on the piste from it.

Additional devices(additional devices on the piste)– devices or systems which are connected directly to the main apparatus (Master) and receive data directly from it (without use of any intermediate nodes). As the additional devices it is recommended to use only those devices and systems where the efficiency of receiving the Master's condition is critically important for the athletes on the piste and the referee.

Additional devices include, for example, slave, video refereeing system, e,t,c,

Additional devices can be connected to the apparatus, directly to the Master (e.g., via RS-485 interface) and through network circuits of Global Information System Fencing of Competitions (e.g, by protocol UDP/TCP).

Video Referee – video refereeing system is on the most important additional devices of the piste.

Scoring machines Server – system which joins all the main apparatus (Masters) and provides communication between them and other Nodes in a real-time mode.

Management of fencing competition – homologated FIE program-apparatus set which manages the competitions, forms the lists of participants, groups, classification, protocols of the bouts, reports e.t.c. Besides, Management of fencing competition forms official results of the competitions.

Manager(s) – node with Management of fencing competition software.

Server of the results – system of distribution of the current status of the competitions between nodes. Server of the results of Green and Yellow levels provide the information about the tournament in a real-time mode. It saves and distributes the information about the participants (lists, photos, pictures with the flags, e.t.c), lists of the groups and tables, current status of all the bouts at all the pistes; intermediate and official results, e.t.c.

Local information service – is an open web-server (or other service) for receiving the full information about the tournament for spectators through public network of the competitions.

Information screens – information screens at the pistes and at the arena, projector screens, e.t.c. Information screens – are used for the direct and visual informing of the spectators at the arena.

Live – is a system of direct video or text streaming of the results of the competitions to the Internet (to the remote public resources).

Weapon control information system (Weapon control) – information system of weapon control Zone.

Client – is a system or a device which is registered in the server (server of hits registration or at the results server) in order to get the information about the situation on the pistes or the results of the competitions in a real-time mode.

Abstract commands (commands) - general commands which are used during organization of communication of several nodes. The name and characteristic of the command are indicated while giving the abstract command. Instructions on its type and possible values are indicated for each parameter. All the protocols (Cyrano 2.0, USNP 1.0 and future ones) must implement the mentioned abstract commands. The list of the all using abstract commands see in Appendix B. Abstract commands.

Abstract description of the interaction mechanism¹ – general description of the order of interaction of different nodes with the use of the abstract commands.

Retransmission of the command – sending of the given abstract command from one Node to another one without the changing of the content.

Activation of the bout Активация боя – a special operation with the buttons of the apparatus (Master) which referee presses. The performance of this operation means that the referee has checked the correctness of the last names of the participants and their allocation on the pistes.

Request for ending the of bout Запрос на завершение боя – a special operation with the buttons of the apparatus (Master) which the referee presses. The performance of

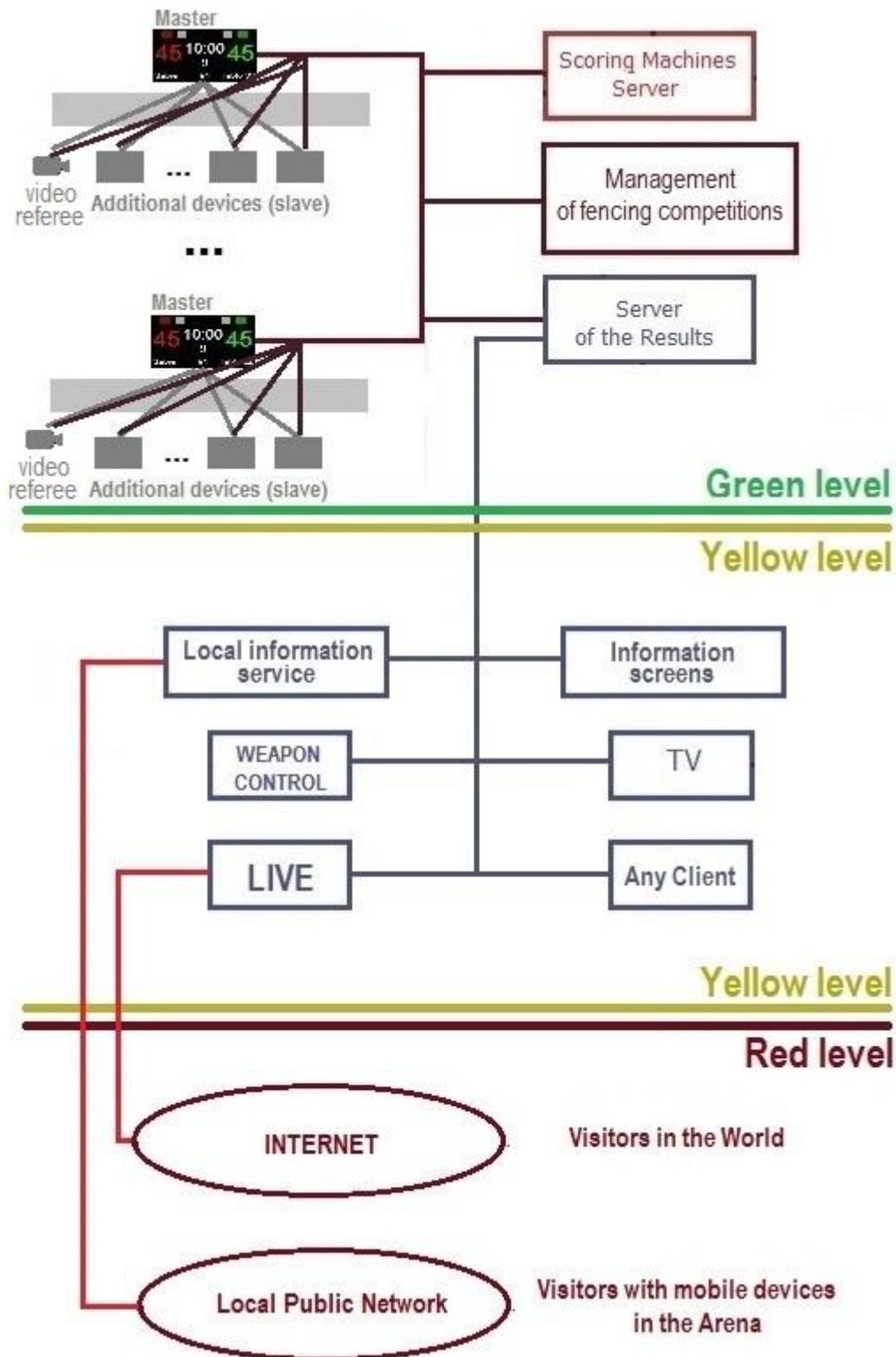
this operation means that the referee has checked and confirms the status of the apparatus with the actual result of the bout.

Deactivation of the bout -Деактивация боя – a special operation with the buttons of the apparatus (Master) which the referee or technician performs. The performance of the current operation means that it is necessary to set the apparatus in the initial position which it had before the activation of the bout¹.

¹ The current operation is performed when the activation of the bout had taken place and later it was known that it was necessary to make changes in the indicated pairs. E.g. to swap the athletes..

Structure of the Global Information System Fencing Competitions

Structure of Global Information system fencing competitions is shown on the scheme:



Global Information System of Fencing Competitions is divided into three part in order of importance.

Green Level consists of the devices and systems, reliable service and intercommunication between them are of critical importance for holding of the competitions.

The Green Level includes:

- The main hits registers (Master) of all the competition pistes;
- Additional devices (repeaters of signalization, video refereeing system, e.t.c.) on all the pistes;
- Server of hits registers;
- Secretarial server (Management of fencing competition)
- Results Server.

Only the systems having FIE Homologation, FIE (or SEMI) recommendations of the use are allowed for connection at Green level.

All the Green level nodes must be unrolled at any FIE competitions.

The direct connection of the networks of the Green level to the Internet is not allowed.

Yellow level consists of the devices and systems which do not affect on holding of the competitions. Generally, on this level there are systems for informing spectators about the competitions. Besides, the extended systems of holding of the competitions as a Zone of weapon control information system are connected on this level.

All the devices of Yellow level can receive the information only from each other or from the Results Server. The direct connection of the systems from the Yellow level to the Green level (apart from the Results Server) is not allowed.

It is recommended to divide physically or logically the networks of Green or Yellow levels with the means of information protection (e.g.routers with inter-network screens function).

Only the systems having FIE Homologation, FIE (or SEMI) recommendations of the use, Organizers' of the competitions recommendation with consent of TD and SEMI

The nodes of the Yellow level are not necessary. The Organizers define the necessity of the use of one or another node.

The direct connection of the networks of Yellow level to the Internet is not allowed.

Red level - consists of the devices and systems of general use as public local networks or Internet.

The access of the systems and devices to the Red level is not limited.

The direct connection of the systems and devices of the Red level to the Yellow or Green level is not allowed. Any system or device from the Red level can be connected only to the system or device of Yellow level which must provide the protection of the information both on Yellow and Green levels from possible attacks from Red level.

Network configuration of the Global Information System of Fencing Competitions

All Global Information System of Fencing Competitions nodes are joined in a single local network based on the number of protocols TCP/IP.

Address space 172.20.x.x is used with the mask of sub-network (255.255.0.0).

The detailed allocation of IP addresses is given in **Appendix A. IP addresses map**

Master scoring machine and additional devices

One main apparatus (Master) providing hits registration and signalization should be placed on each piste.

Master should comply with all the requirements of FIE regulations on holding of fencing competitions. Besides, Master should comply with the additional requirements of the present standard.

Master is the Global Information System of Fencing Competitions nodes, i.e. it must provide the connection to Interface Ethernet (RJ-45). Master must realize the functional of a command of the number of the piste and provide the IP address according to the present standard.

Master must support the direct connection to itself through Interface RS-485 (slot - D-SUB-9F).

Any Additional device, connected to Master with the use of RS-485 interface must have both input and output with (slot - D-SUB-9F) interface. Any information which comes on the input of the device must retransmit on the output without any distortion. The delay between the arrival of any byte on input and its retransmission on output should not exceed 50ms.

Master must support the following protocols:

- for Interface Ethernet (RJ-45)
 - Cyrano 1.0.
 - Cyrano 2.0
 - USNP 1.0
- for Interface RS-485
 - USNP 1.0

Master must allow to perform the connections to itself only for the devices with IP 172.20.x.y, where x-is a number of the piste Master and $y \in \{1, \dots, 255\}$, and also Scoring machine Server. The direct connection to Master of the systems and devices with IP 172.20.0.y, где $x \in \{1, \dots, 255\}$ is not allowed.

The addressing of the Master to Server of the results(172.20.0.2:50100) is allowed in order to get the photos of the athletes, pictures of the national flags, composition of the groups e.t.c. to display the present information on all the information indicators (monitors, screens, e.t.c.). In that case Master acts as a Client for Server of the results. Mechanism of the current connection is described in “Server of the Results” chapter.

The connection of all other IP addresses to Master is categorically prohibited. The present ban must be implemented in Master software.

Master must pass the time of the bout within the accuracy of cent second.

Master must realize the option of manual correction of the timer by a referee, including centiseconds.

Master must realize the mechanisms of activation, deactivation and ending of the bout. The current events must be displayed in its condition.

Independently whether or not the Master has indicators for displaying the names of the athletes it must keep (in its internal storage) the received data from the Server and include them in its condition.

Master must realize the option of calling of the technician, doctor, video refereeing system specialist and TD representative on the piste according to the protocols of Cyrano and USNP.

Master must realize the following functioning mode with Global Information System of Fencing Competitions:

- **Registration in the system** – a mode, when Master sends the request for registration in the system to Scoring machines Server;
- **Operating mode** – a mode, when Master sends its condition (command. INFO) to Scoring machines Server. Master sends its condition under any event from the list of specially registered events (see Appendix C. Important events on the piste).

The operating procedures of any mode is described in **Appendix D. Scoring machines Server**

Scoring machines Server

Scoring machines Server is the Global Information System of Fencing Competitions nodes and must be started on the node with IP 172.20.0.1.

Scoring machines Server is used to organize the interactions of the hits registers with the other nodes.

Scoring machines Server are provided by the Masters producer which are used on the piste for finals or color pistes.

Scoring machines Server keeps all the information about the arena configuration (activeness of the hits registers and their condition).

For more detailed information see Appendix D. Description of algorithms of work of Scoring machines Server.

Server of the results

Server of the results is the Global Information System of Fencing Competitions nodes and must be started on the node with IP 172.20.0.8.

On the Server of the results FTP and HTTP servers must be started additionally. . Whereas the FTP and HTTP folders must be set up in such a way that if using FTP it would be possible to change the composition of HTTP folders. The structure of the folders and their meaning is described in Appendix FTP and HTTP folders in the Server of the results.

Server of the results using at the present competitions is provided by the producer Management of fencing competition.

Server of the results must connect to the Server of hits registers and receives its condition, register its clients and sends them the condition of the registers.

More detailed information about the functioning of the mechanisms is given in Appendix E. The description of the algorithms of work of Server if the results

Management of fencing competition software

Management of fencing competition software is aimed to hold competitions and to form the official results.

Management of fencing competition software must undergo FIE homologation for accordance of FIE Regulations of holding of the competitions.

Management of fencing competition software must independently provide a storage and protection of the official results of the competitions. And also provide independent functioning from Global Information System of Fencing Competitions.

The breakdown of the Servers of Серверов Global Information System Fencing Competitions should not fail the work of Management of fencing competition software.

Management of fencing competition software must connect to the Global Information System Fencing of Competitions with use of devices with IP addresses 172.20.0.9-172.20.0.32

Management of fencing competition must provide the simultaneous service up to 8 independent competitions at the Arena.

Direct interaction between Management of fencing competition and Masters is not allowed

Direct interaction between Management of fencing competition and systems of Yellow and Red levels is not allowed.

Manager is responsible for control of coincidence of the information, sent to the piste..

Uploaded information must be full. E.g. there should be all the pairs in the table, even those which have qualified.

Video referee

Video refereeing is one of the most important systems out of the additional ones, installed on the piste.

Video refereeing system on the piste must comply with all the requirements of the Regulation of the competitions and regulations of the present standard.

Video refereeing system must be in Global Information System of Fencing Competitions nodes i.e. must provide the connection to Interface Ethernet (RJ-45) with the use of Cyrano 2.0 и USNP 1.0. protocols

Besides, video refereeing system can be connected to Master with the use of RS-485 interface and USNP 1.0. protocol.

Video recording should be in HD (1280x720) format, and starting with 2015 in FullHD (1920x1080) format.

Video record must contain the information about the names of the athletes, Master condition and the value of the geographical time of the place of holding of the competitions. The value of the timer of the time of the bout must be within the accuracy of centiseconds.

The value of the geographical time must be within the accuracy of 1000 fraction of the second.

Upon the end of each day the video refereeing system must form an archive disk with the video record of all the bouts recorded in a unified open format VideoRD 1.0 (for the description of the format see **Appendix G . Standart VideoRD 1.0. Format of the disk with video referee results.**).

The formed archive disk must be handed to the authorized body (appointed by FIE) which distributes it among the National fencing federations.

Control keys of the video refereeing system (buttons on a keyboard) must conform with the requirements (see **Appendix H. Videorefreee controls keys**).

Video refereeing system must provide to the Technical Directorate the monitor with the option of choosing and playing of video record of any episode from any out of 5 pistes.

In order to control the operator's work, the referee's monitor should display everything what the video camera records.

Video refereeing system must support the streaming to the Internet from all the five pistes with the quality necessary for TV broadcasting.

Appendix A. IP addresses map.

Range of the addresses 172.20.0.x (255 addresses) are used by nodes with the control systems only at the Green level. In this case, the addresses are::

- 172.20.0.1 – 172.20.0.32 – are used by the Servers and (Management of fencing competitions)
- 172.20.0.33 – 172.20.0.128 – reserved by SEMI and distributed on request from the Producers of the apparatus and software. No address from this range can be statically busy of a system or device without the SEMI consent.
- 172.20.0.129 – 172.20.0.240 – dynamically distributes by DHCP server. No address of the given range can be statically busy.
- 172.20.0.241 – 172.20.0.255 –free addresses.

Range of the addresses 172.20.1.x ... 172.20.64.x is reserved for the main hits registers (Masters) and additional devices on the pistes and can be used only by them. In this case, the addresses are:При этом адреса:

- 172.20.x.1 - are given only to Master hits registers on piste x присваиваются только Master фиксаторам уколов на дорожке x.
- 172.20.x.2 – 172.20.x.16 - are given only to hits registers - repeaters (slave) on the piste x.
- 172.20.x.17 – 172.20.x.32 - are given only to the refereeing systems, working on the piste x (e.g. video refereeing system).
- 172.20.x.33 – 172.20.x.48 - are given only to the system of live-streaming to the Internet from the piste x.
- 172.20.x.49 – 172.20.x.128 - are reserved for SEMI and distributes on request from the Producers of the apparatus and software. No address from this range can be statically busy of a system or device without the SEMI consent.
- 172.20.x.128– 172.20.x.255 - free for use

Signal table between the piste number and the used IP addresses on them is given below in the table **IP addresses map**.

Range of the addresses 172.20.65.x .. 172.20.128.x is reserved and can not be used without SEMI consent. Any producer of the systems or devices can address to SEMI and ask to allocate one or several IP addresses from the reserved range.

In case of the SEMI positive answer the allocated address (addresses) is reserved to the Producer and the notes are made in the IP addresses register.

Range of the addresses 172.20.128.x .. 172.20.254.x are dynamically distributes by DHCP server between nodes at the Yellow level. No address can be statically busy of the system or device.

Range of the addresses 172.20.255.x – is free for any use

Таблица. IP addresses map

Node name/type	IP addresses
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Important nodes

Scoring Machines Server	172.20.0.1
Backup Scoring Machines Server	172.20.0.2
Free for special servers	172.20.0.3-172.20.0.6
Backup Server of the results	172.20.0.7
Server of the results	172.20.0.8
Devices with Management fencing competitions system	172.20.0.9 - 172.20.0.32
Reserved SEMI	172.20.0.33 - 172.20.0.128
Dynamically allocated by DHCP server	172.20.0.129 - 172.20.0.240
Free	172.20.0.241 - 172.20.0.255

Pistes

FINAL	172.20.60.1 172.20.60.2 - 172.20.60.15 172.20.60.16 - 172.20.60.32 172.20.60.33 - 172.20.60.48 172.20.60.49 - 172.20.60.128 172.20.60.129 - 172.20.60.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
BLUE	172.20.61.1 172.20.61.2 - 172.20.61.15 172.20.61.16 - 172.20.61.32 172.20.61.33 - 172.20.61.48 172.20.61.49 - 172.20.61.128 172.20.61.129 - 172.20.61.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
YELLOW	172.20.62.1 172.20.62.2 - 172.20.62.15 172.20.62.16 - 172.20.62.32 172.20.62.33 - 172.20.62.48 172.20.62.49 - 172.20.62.128 172.20.62.129 - 172.20.62.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
GREEN	172.20.63.1 172.20.63.2 - 172.20.63.15 172.20.63.16 - 172.20.63.32 172.20.63.33 - 172.20.63.48 172.20.63.49 - 172.20.63.128 172.20.63.129 - 172.20.63.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
RED	172.20.64.1 172.20.64.2 - 172.20.64.15 172.20.64.16 - 172.20.64.32 172.20.64.33 - 172.20.64.48 172.20.64.49 - 172.20.64.128 172.20.64.129 - 172.20.64.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
Piste 1	172.20.1.1 172.20.1.2 - 172.20.1.15	Master scoring machine Slave scoring machines

	172.20.1.16 - 172.20.1.32 172.20.1.33 - 172.20.1.48 172.20.1.49 - 172.20.1.128 172.20.1.129 - 172.20.1.255	Referees systems (video referee) Live reserved for SEMI free
Piste 2	172.20.2.1 172.20.2.2 - 172.20.2.15 172.20.2.16 - 172.20.2.32 172.20.2.33 - 172.20.2.48 172.20.2.49 - 172.20.2.128 172.20.2.129 - 172.20.2.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
....		
Piste N	172.20.N.1 172.20.N.2 - 172.20.N.15 172.20.N.16 - 172.20.N.32 172.20.N.33 - 172.20.N.48 172.20.N.49 - 172.20.N.128 172.20.N.129 - 172.20.N.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
....		
Piste 59	172.20.59.1 172.20.59.2 - 172.20.59.15 172.20.59.16 - 172.20.59.32 172.20.59.33 - 172.20.59.48 172.20.59.49 - 172.20.59.128 172.20.59.129 - 172.20.59.255	Master scoring machine Slave scoring machines Referees systems (video referee) Live reserved for SEMI free
Other		
Reserved SEMI	172.20.65.x – 172.20.127.x	
Reserved for Wi-Fi access point.	172.20.128.x	
Dynamically allocated by DHCP server	172.20.129.x – 172.20.254.x	
Free	172.20.255.x	