CYRANO protocol:

Ethernet fencing protocol for communication between computers and piste apparatuses

Version 1.1 of October 11, 2019
Based on Version 1.0, December 05, 2008
Modifications concern P-cards and stopwatch
Made by J-F Nicaud and the Favero Company for the Budapest 2019 World Championship
They are highlighted in yellow in the document
Modification of October 11 is the maximum length of field L7 set to 1 (correction of an inconsistency)

1. Introduction

This protocol aims at describing the communication between software managing fencing competitions (shortly named Software below), and piste apparatus (shortly names Apparatus below) using the Ethernet IP protocol. Communication occurs in two directions: Software sends matches to devices; devices send scores, stopwatch, lights, priority, etc., to Software.

The technical name of the protocol is **EFP1.1**
The use name is **CYRANO**.

Compatibility of EFP1 an EFP1.1
- On the apparatuses side it is suggested to maintain both protocols: if the apparatus receives an EFP1 message, it answers with Cyrano 1.0; if it receives an EFP1.1 message, it answers with Cyrano 1.1.
- On the Software side it is suggested to have a choice between running in Cyrano 1.0 and Cyrano 1.1.

History

In April 2008, Favero contacted Nicaud telling him that he intends to create a new Apparatus which will display the fencer names and nations and will communicate with Software with Ethernet IP messages if a protocol can be defined for that. Nicaud said "yes" and sent a first version of a protocol. In May, Favero and Nicaud elaborated this protocol with more details and decided to make it public and also to discuss with FIE and other manufacturers in order to eventually improve the protocol. Discussions occurred in May and June and result in this document.

The discussion group was composed of:
- FIE (Dos Santos <jecdossantos@gmail.com>, Ioan Pop <pop.fie@gmail.com>, Nathalie Rodriguez. <nr@fie.ch>),
- Engarde (Jean-Francois Nicaud <Jean-Francois.Nicaud@imag.fr>, PALFI Georges <georges.palfi@free.fr>)
- Favero (Gino Favero <orders@favero.com>)
- Allstar (Frank Messemer <f.messemer@t-online.de>)
- EscrimeTec (Frédéric Marciano <EscrimeTec@aol.com>)
- Spanish manufacturer (Diaz <fer@cib.csic.es>, Miguel Ojeda <m.ojeda@telefonica.net>)
- Swiss Timing (Cuenin, Thierry <Thierry.Cuenin@swisstiming.com>)
- Kabcom (KABCOM <kabcom@wanadoo.fr>)
- Ophart (German software Derkum <s.lange-derkum@fechten.org>)
- Tesis (Italian software Tedeschi <tesis@tesis.org>)

2. Sort of IP protocol

The UDP protocol is used: it is light, it sends information without establishing connection and without reception acknowledge. When acknowledge is required, it is done inside the messages.
See http://tools.ietf.org/html/rfc768
In French: http://fr.wikipedia.org/wiki/User_Datagram_Protocol
In Italian: http://it.wikipedia.org/wiki/User_Datagram_Protocol
In English: http://en.wikipedia.org/wiki/User_Datagram_Protocol
The IP addresses used are not dynamic so that Software can have a table with all the IP addresses and the piste identifiers of a competition.
The port number used is 50100. It is in the range of Dynamic and/or Private Ports which is from 49152 through 65535 (see: http://www.iana.org/assignments/port-numbers).
The idea is to always use it or to use it except for special reasons. Software will allow changing the port number. It is suggested that Apparatuses also allow changing the port number.

3. Content of messages

In individual competitions, a **match** occurs between two individuals and may have several **periods** with a 1 minute pause between two periods.
In team competitions, a **match** occurs between two teams and is composed of **rounds** between individuals.
The period number and the round number are generally displayed by the Apparatuses using the same area.

HELLO message

The HELLO message tells to the Apparatus that Software is online; it contains only the compelling fields (see below). Software sends an HELLO message to each piste each 15 seconds.

NEXT message

The NEXT message sent by the Apparatus, asks to Software the data for next round/match.

PREV message

The PREV message sent by the Apparatus, asks to Software the data of previous round/match.

DISP message

The DISP message sent by Software providing a match/round to the Apparatus and the INFO message sent by the Apparatus providing information to Software contain the identification of the match and round. There is a fencer identifier for left and right fencers. Software uses this identifier and not the fencer name because the name can change at any time (correction of a spelling error - change of the parameter for producing names for devices). Software has to take care of the homonymous names. It is worth to use the Olympics convention for 10 characters names with first letter of first name possibly parameterized to allow larger names (10, 12, 15, etc.).

If the referee changes the right/left position of the fencers on the piste and the Apparatus, the Apparatus exchanges the values of the right and left fencers (Id, name, nat, etc.) in order to correspond to the piste. Software use the fencer Id to give the correct score, card, etc. to the correct fencer.

INFO message

The Apparatus sends an INFO message each time there is a change in its state. The content of this message can be limited to the compelling fields and the changed elements. In addition, the Apparatus sends a full INFO message each time it received an HELLO message (see below).
Here is a list of the possible INFO message:
- partial INFO message: it contains all the compelling fields and only the changed fields;
- full INFO message: it contains all the compelling fields and the ones that can change on the Apparatus;
- incomplete INFO message: it contains only the known data (Protocol, Com, Piste, Compe, score, stopwatch, cards, status...) and the unknown fields are empty or have default values.
Note that the INFO message (finished) has the field 14 (state) to the value 'E' (**Ending**).

ACK message

The ACK message sent by Software, tells to the Apparatus that the end of match/round has been approved.

NAK message

The NAK message sent by Software, tells to the Apparatus that the end of match/round has not been approved.

(**) means "compelling field" for all messages.
(*) means "compelling field" for DISP and INFO messages except incomplete INFO when waiting without match

#	Fieldname	Description, remarks	Values, explanations, remarks	Examples	Max length
1	Protocol (**)	Name of the protocol	EFP1.1 for Ethernet fencing protocol number 1.1	EFP1.1	6
2	Com (**)	Name of the command	HELLO: tells that Software is online (Software → Apparatus) DISP: to display the match (Software → Apparatus) ACK: acknowledges reception of the end of a match or round (Software → Apparatus) NAK: indicates the reception of an incorrect end of a match (Software → Apparatus) INFO: score, stopwatch, light, etc. (Apparatus → Software) NEXT: asks Software to send the next round or the next match (Apparatus → Software) PREV: asks Software to send the previous round or the previous match (Apparatus → Software)	HELLO DISP ACK NAK INFO NEXT PREV	6
3	Piste (**)	Piste identifier	Can be a number, "podium", "rouge", "vert", etc.	17	8
4	Compe (**)	Competition identifier	Allows several competitions	efj-eq	8
5	Phase (*)	Phase number	First round of poules is 1 when it exists; second round of poules is 2 when it exists; tableau is "last round of poules number" plus 1	1	2
6	PoulTab (*)	Identifier of the poule or the tableau	Number of the poule or identifier of the tableau	3 A32	8
7	Match (*)	Match number	Number of the match inside the poule or the tableau	12	3
8	Round (*)	Round number	Number of the round for team competitions (1-9), of the period for individual competitions (1-3)	6	2
9	Time	Time to start the match	The time to start the match sent by Software can be displayed by Apparatuses	13:15	5
10	Stopwatch	Value of the stopwatch	In INFO messages, Apparatuses put here the value of the stopwatch. It contains optionally the 1/100s after a dot. 1/100s is mandatory when time is less than 10s. It is free otherwise. If the device has internally 1/10s instead of 1/100s, it uses 1/100s in the protocol. In DISP messages, Software generally makes this field empty. It can put here a value of the stopwatch when going back to a match ended by error.	1:09 1:09.25	8
11	Type	Type of competition	I: individual T: team	I	1
12	Weapon		F: fleuret E: épée S: sabre *Can be used by Apparatuses to adapt to the weapon*	S	1
13	Priority	Priority	N: none R: right L: left	N	1
14	State	State of the Apparatus	F: Fencing H: Halt P: Pause W: Waiting E: Ending	H	1
15	RefId	Referee identifier	Can be ignored by Apparatuses	132	8
16	RefName	Referee name	Can be ignored by Apparatuses	J. Smith	20
17	RefNat	Referee nation	Can be ignored by Apparatuses	GBR	3
R1	RightId (*)	Right fencer Id		28	8
R2	RightName	Right fencer name		P. Martin	20
R3	RightNat	Right fencer nation		FRA	3
R4	Rscore	Right fencer score		8	2
R5	Rstatus	Right fencer status	U: Undefined V: Victoire D: Défaite A: Abandonment E: Exclusion	V	1
R6	RYcard	Right fencer yellow card	Number of yellow cards for right fencer (0-1)	0	1
R7	RRcard	Right fencer red card	Number of red cards for right fencer (0-9)	1	1
R8	RLight	Right fencer light	0: Right light off 1: Right light on	1	1
R9	RWlight	Right fencer white light	0: Right white light off 1: Right white light on	0	1

R10	RMedical	Right fencer medical interventions	Number of medical interventions on right fencer	0	1
R11	RReserve	Right reserve fencer introduction	N: none R: introduce the reserve for current round	N	1
R12	RP-card	Right fencer P-card	0: no P-card 1: P-yellow card 2: one P-red card 3: two P-red cards 4: one P-black card 5: two P-black cards	1	1
L1	LeftId (*)	Left fencer Id		32	8
L2	LeftName	Left fencer name		B. Panini	20
L3	LeftNat	Left fencer nation		ITA	3
L4	Lscore	Left fencer score		6	2
L5	Lstatus	Left fencer status	U: Undefined V: Victoire D: Défaite A: Abandonment E: Exclusion	D	1
L6	LYcard	Left fencer yellow card	Number of yellow cards for Left fencer (0-1)	0	1
L7	LRcard	Left fencer red card	Number of red cards for Left fencer (0-9)	1	1
L8	LLight	Left fencer light	0: Left light off 1: Left light on	0	1
L9	LWlight	Left fencer white light	0: Left white light off 1: Left white light on	0	1
L10	RMedical	Left fencer medical interventions	Number of medical interventions on left fencer	0	1
L11	LReserve	Left reserve fencer introduction	N: none R: introduce the reserve for current round	N	1
L12	LP-card	Left fencer P-card	0: no P-card 1: P-yellow card 2: one P-red card 3: two P-red cards 4: one P-black card 5: two P-black cards	1	1
					172

4. Behaviour of Software and Apparatuses

An Apparatus has several states:
1) **Fencing**: fencers are fencing, the stopwatch is running;
2) **Halt**: between "halt" and "aller", the stopwatch is stopped;
3) **Pause**: between two periods, the stopwatch is running;
4) **Ending**: between the end of a match (or round for Team competitions) and the acknowledge receipt;
5) **Waiting**: a match/round is finished (still displayed on the Apparatus) or a match/round has not yet started (already displayed on the Apparatus) or there is no match/round. The stopwatch may indicate the starting time of the match. The scores may be blank.

Let us call **Active** the union of the four first states (all except waiting).

When the Apparatus receives an HELLO message, it sends a full INFO message to Software if it is in **Active** state; if it is in waiting state, it sends an incomplete INFO message with the piste number and the **Waiting** state and other available information (maybe none or the complete information if it has already received a DISP message).

The Apparatuses have a yellow light indicating when the Software connection is on (it turns on when it receives an HELLO message - it turns off after 40s without receiving an HELLO message).

The Apparatuses have a red light indicating when the Apparatus is active.

The Apparatuses have the following buttons: "**BEGIN**", "**END**", "**NEXT**" and "**PREVIOUS**".
"**END**" can be named "**END + final approval**" in order to precise its action.

Behaviour of the Apparatus

State of the Apparatus	Event	Behaviour of the Apparatus	New state of the Apparatus
Active	Change on the Apparatus	sends an INFO (not finished) message	Active
Active	Reception of HELLO message	sends a full INFO message	Active
Active	Hit on the "END" button	sends an INFO (finished) message	Active (Ending)
Active	Reception of ACK message	changes state → sends an INFO message	Waiting
Active	Reception of DISP message	ignore	Active
Waiting	Reception of HELLO message	sends an INFO message	Waiting
Waiting	Reception of DISP message	Install the match/round	Waiting
Waiting	Hit on the "BEGIN" button	changes state → sends an INFO message	Active (Halt)
Waiting	Reception of ACK message	ignore	Waiting

Hitting the "**NEXT**" and "**PREVIOUS**" button does nothing when the state of the Apparatus is active (the Apparatus sends nothing to Software).

In individual competitions, the "**END**" button indicates the end of the match. The situation is correct for the end of the match if:
1) The status of both fencers is normal and
   a. the scores are different
   b. or the scores are equal and there is a priority
2) or the status of one fencer or both fencers is abandonment or exclusion.
The situation of two fencers with **normal status, equal scores and no priority** is an incorrect end of match.

In team competitions, the "**END**" button indicates the end of the round and, in the case of the last round, the end of the match. The end of the match is correct / incorrect like in individual competitions. The end of a round which is not the last one is always correct.

Software takes care of fencers' status only when the state is **Ending**.

If Software receives an incorrect end of match, it does not send an ACK message but sends an NAK "not acknowledge" message, so the apparatus can show to the referee a message as for example "END not accepted" or "Incorrect END".

The matches/rounds sent by Software may have scores to be displayed. This is the case for team rounds, except the first one. This is also the case when the Apparatus asks for the previous match/round. The rule is: when it receives a DISP message, the Apparatus displays the score it contains and the "**BEGIN**" button must not reset the scores.

Detailed behaviour of the buttons

- "**NEXT**" button. It works only if the Apparatus is on the **Waiting** status. It requires Software to send to the Apparatus the next match/round information. The referee will see the new fencer names etc. on the LCD display but the Apparatus continues to be on the **Waiting** state.

- "**PREVIOUS**" button. It works only if the Apparatus is on the **Waiting** status. It requires Software to send to the Apparatus the previous match/round information. It is useful to modify a mistake. To modify a value it is necessary to push also the "**BEGIN**" button, make the modifications, and at the end push "**END + final approval**".

- "**BEGIN**" button. It works only if the Apparatus is on the **Waiting** status. The "**BEGIN**" button will put the Apparatus on the **Active** status: it means that it will send continuously to Software all the changes that happen on the match/round. A red light on the apparatus will signal when it is on the active status.

- "**END + final approval**" button. It works only if the Apparatus is on the **Active** status. It is better to use this long name to emphasize that it is sent the conclusive results. The Apparatus will go to the **Waiting** status only if it will receive an ACK message.

It is suggested that each one of the 4 above buttons is accepted only if it is pushed together to an "**ALT**" button, to avoid wrong button actions. Anyway, any manufacturer can decide if want or not to include a security system.

Behaviour for the reserve fencer

The value 'R' (RESERVE) in the "R11" or "L11" field, sent by Apparatus, is accepted from Software only for Team competitions, when there is a reserve fencer and the reserve fencer has not yet been used. It can be cancelled during the round it has been set; subsequently to the insertion of the reserve fencer, Software will insert the reserve fencer (id, Name, Nation) in the following rounds.

5. Breakdown, lost messages and errors

UDP runs without reception acknowledge. Reception acknowledge messages (ACK and NAK) have been inserted for a particular situation.

Lost messages are solved this way

1) In the case of the lost of an HELLO or an INFO (not finished) message, another message of the same kind will be sent later.
2) In the case of the lost of an INFO (finished) message, Software will not send the ACK or NAK message. The active red light will not go off, the piste assistant will hit again the "**END**" button.
3) In the case of the lost of an ACK or NAK message, the active light will not go off, the piste assistant will hit again the "**END**" button.
4) In the case of the lost of a NEXT, a PREV or a DISP message, the new match/round will not be displayed on the Apparatus, the piste assistant will hit again the "**NEXT**" or "**PREVIOUS**" button.

Errors

1) The piste assistant hits the "**END**" button in an inadequate situation (two fencers with normal status, equal scores and no priority). The Apparatus receives the NAK message and diplays "Incorrect END".
2) The piste assistant hits the "**END**" button in a formally adequate situation but the match/round is not finished (there is still fencing to do). The piste assistant hits the "**PREVIOUS**" button to ask Software to put the previous match/round to unfinished and to send it again to the Apparatus (DISP message).
3) The piste assistant hits the "**END**" button with a wrong score. The piste assistant uses the "**PREVIOUS**" button to correct the score or asks the Software manager to correct the score with Software.

6. Syntax of the content

A two levels CSV syntax is used. There are 3 mains areas separated by "%", each one having several values separated by "|".

The first area is the general area. The second is the right fencer area. The third is the left fencer area.

Values are given with their natural length (no filling with blanks or zeros to reach a particular length).

Example:
`|EFP1.1|DISP|8|fm-eq|2|B64| … |%|28|P. Martin|FRA||U|…|%|32| B. Panini|ITA||U|…|%|`

An empty value is given by two consecutive "|".
If from a position of an area to the end of this area all the values are empty, they can be omitted.
If the last (the two last) area are empty, it (they) can be omitted.

For example, the HELLO message sent by Software for piste 17 is:
`|EFP1.1|HELLO|17|fm-eq|%|`

Example of the NEXT message, sent by the Apparatus:
`|EFP1.1|NEXT|17|fm-eq|%|`

Example of the PREV message, sent by the Apparatus:
`|EFP1.1|PREV|17|fm-eq|%|`

Examples of incomplete INFO messages, sent by the Apparatus when it is on the **Waiting** status, and when it has not received any DISP message:
`|EFP1.1|INFO|||||||||3:00|||||W|%||||0|U|0|1|1|0|0|N|%||||0|U|0|1|0|0|0|N|%|`
or an "empty" DISP message (see below):
`|EFP1.1|INFO|17|efj-eq||||||3:00||||W|%||||8|V|0|1|1|0|0|N|%||||6|D|0|1|0|0|0|N|%|`
In this case the Apparatus will send only its data (time, score, lights, cards, status, etc). All the unknown fields will be sent as empty fields (competition ID, referee fields, fencers ID, etc). This type of incomplete INFO message is sent when the Apparatus:
- has not received any DISP message from Software;
- has all the data set to zero, by pushing its "**RESET ALL**" button;
- Software sent an "empty" DISP message. It could be that the Apparatus requires a next match but Software is not ready to give it the next one, so if Software sends an "empty" DISP message without the fencers ID, the Apparatus can show to the referee an LCD message as for example "No match available at the moment".

Example of the INFO message, sent by the Apparatus when it is on the **Waiting** status, with all the data of the match:
`|EFP1.1|INFO|17|efj-eq|1|A32|12|2|10:30|3:00|I|S||W|132|`
`J.Smith|GBR|%|28|P.Martin|FRA|8|V|0|1|1|0|0|N|%|32|B. Panini|ITA|6|D|0|1|0|0|0|N|%|`
Please note that in the above message the "apparatus status" field is in the 'W' = **Waiting** status. This field can have also the following statuses:
- 'H' = Halt,
- 'F' = Fencing,
- 'P' = Pause,
- 'E' = Ending. In this case the Apparatus informs Software that the match is finished and this status will change from "E" to 'W' when the Apparatus will receive an "ACK accepted" message from Software.

Example of the INFO message, sent by the Apparatus when it is on the **Waiting** status without a match:
`|EFP1.1|INFO|||||||||||||W||%|`

7. Size

The max length is about 210 characters.