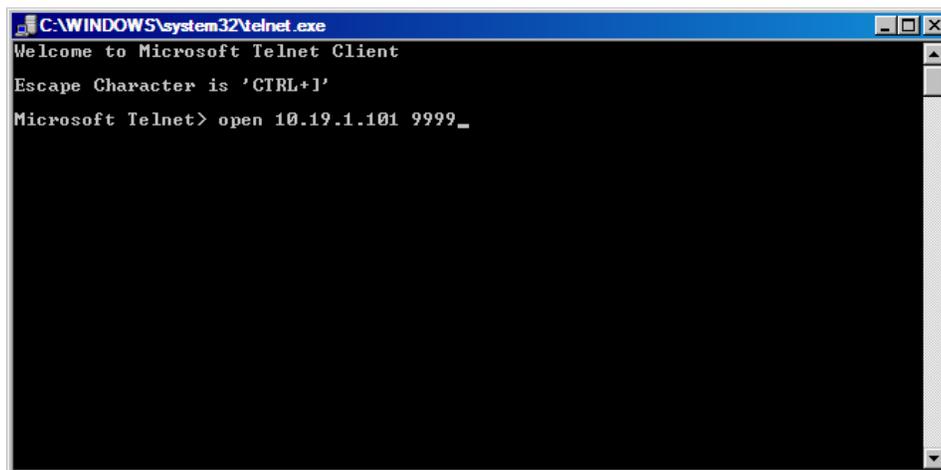**FIGURE – MICROSOFT TELNET WINDOW**

6.3.2.(A) IPICO SPORTS ELITE READER CONSOLE ("9999," CONTROL) PORT

To access the reader through the Microsoft Telnet Application, ensure that the IPICO Sports Elite Reader is powered and that the Delta module is also powered, and has completed start-up. Once the IPICO Sports Elite Reader is ready for communication, connect to the reader from a computer using the orange "crossover" cable provided with the reader (or another compatible "crossover" cable). Once connected, type the following into the Microsoft Telnet window: "open" (followed by a space), the IP (Internet Protocol) address of the reader (labeled on the front panel of the Delta module) followed by another space, "9999". Once these parameters have been entered, the string entered into the Microsoft Telnet window should look like the following (using reader address 10.19.1.101 as an example):

FIGURE 42 – MICROSOFT TELNET WINDOW WITH INFORMATION ENTERED

Once the correct information has been entered in the format listed above, press the "Enter" or "Return" keyboard key to enter the information, and begin a connection through Microsoft Telnet. Once connected, the cursor may move to the upper right-hand corner of the window, or the cursor may not move. To test the connection, hit the "Enter" or "Return" keyboard key. If the cursor

creates a new line in the window, the connection has been made. Key the word "help" into the Microsoft Telnet window to cause the following command menu to display.

FIGURE 43 – TELNET CONTROL PORT HELP MENU

The port, "9999," to which connection is being attempted is the Telnet reader settings and configuration port. As seen above, this port offers seven (7) features.

1. Set Date
The "9999" (Control) port allows the user to set the time using a formatted string that is detailed in the "command" line below the "function" heading. The format of the string is as follows:

        setdate.yymmddHH:MM:SS

For example, to set the IPICO Sports Elite Reader clock to 3:30 PM on Wednesday, November 12, 2008, the string would be formatted as follows:

        setdate.08111215:30:30

Once the correct string has been entered, simply pressing the "Enter" or "Return" keyboard key will send the command to the reader, prompting the reader to reply with

        date.Wed Nov 12 15:30:30 [Time Zone Extension] 2008

2. Get Date

The IPICO Sports Elite Reader also allows the user to retrieve the date through the control ("9999") port. This is done by entering the "getdate" command, exactly as previously typed. Once "getdate" has been entered, and the "Enter" or "Return" keyboard key has been pressed, the reader will respond with the current, internal reader date and time as follows (assuming the date to be Wednesday, November 12, 2008 at 4:00 PM):

date.Wed Nov 12 16:00:00 [Time Zone Extension] 2008

3. Insert Marker

The IPICO Sports Elite Reader "9999" (control) port also allows for a user to insert text (ASCII) markers into all timing record files. As an example, to insert a marker "New Race" into a file, the following string format would need to be typed into the console window:

insert_marker.New Race

With which the reader will be prompted to respond:

marker_inserted

4. Clear History Files

The "9999" (control) port of the IPICO Sports Elite Reader also gives the user to perform a one-command complete clearing of the reader history files. This is done by entering the command:

clear_history

To which the reader will respond:

history_cleared

5. IPX Set-Date

The "IPX Set-Date" command allows the user to set the date and time of the IPICO Sports Elite Reader through the IPICO IP-X protocol. This feature is usable by the common user, though it is recommended and reserved for programmatic use.

6. IPX Get-Date

The "IPX Get-Date" command allows a user to retrieve the reader's internal date and time using the IPICO IP-X protocol. Similar to the "IPX Set-Date" command, the "IPX Get-Date" command is intended and reserved for programmatic use.

7. Replay

The Replay feature of the IPICO Sports Elite Reader (Operating System version 2.3) allows tag record files to be "replayed" at various speeds and from various points within each of these files. To see the instructional commands for the "Replay" function, type "replay_usage" into the "9999" port window within Microsoft Telnet. The IPICO Sports Elite Reader will respond with the "Replay" syntax help file.

```
replay_usage

\Delta replay.pl version 2.0 usage:

Replay has 4 configurable options:
  1)file
        default: /mnt/data/ttyS0.log
        options: ttyS[0-3], fslsd, infod
        function: replay data from this file
  2)datetime
        default: all
        options: yymmddhhmmss
        function: replay data after this data&time
  3)speed
        default: 0
        options: 0=no delay, 1=recorded speed, [2-100]xfaster than recording
        function: control the playback speed
  4)port
        default: 10300
        options: ports >1024, excl Delta reserved ports [9998,9999,10000,10200,1
0201]
        function: specify the port on which replay will "play"
Action: START replay
  command: "replay_start[ <option>.<value>[ <option>.<value>[ ..]]]\n"
  - Any number of options can be specified in any order
  - Options and values are always coupled and seperated with a "."
  - <Option.Value> pairs are seperated from preceding pairs with a space
  - Omited options will assume their default values
  eg: Starting replay of ttyS1 on port 10500 for all data after the 7th May 2008
 at 12:30
        "replay_start file.ttyS1 port.10500 datetime.080507123000\n"
Action: STOP replay
  command: "replay_stop\n"
  NOTE: All instances of replay will be stopped
```

The list that results from typing in the command "replay_usage" explains the use of replay and all of its various functionalities. The elements of the "replay_start" function are as follows:

File   A selection of the file with which to start replay
DateTime   A selection of the date and time after which to start the replay
Speed   A setting through which the replay can be sped up or slowed down
Port   A configuration option specifying the port on which the replay will occur

The format of replay's usage is then as follows if the file ttys0.log is wished to be replayed after today (29 August, 2008) at 1:09 PM, on port 13000 at no delay:

replay_start file.ttys0 port.13000 datetime.080829130900

Once the command typed is satisfactory, hit the "Enter" key to start the replay. The stream will then begin on port 13000. To view the stream, have a second Microsoft Telnet window open, and access the streaming port by typing (assuming example the IP [Internet Protocol] address to which connection is desired is still 10.19.1.101)

```
Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> o 10.19.1.101 13000
```

Once connected on the port, the replay stream will start. At "no delay" (the default "Speed" option), the reader will replay all data at a high speed. Adjust the given speed element (As listed in the "replay_usage" command) to suit different circumstances.

```
aa0105800018f73901010180829130095449a0
aa0105800018aaa9010101080829130954e1f
aa0105800018f73901000080829130955198
aa0105800018f73901010080829130954bca
aa0105800018aaa9010101080829130954b1d
aa0105800018aaa901010080829130955503ea
aa0105800018aaa90101080829130955507ee
aa0105800018f739010108082913095550fca
aa0105800018aaa9010108082913095510e8
aa0105800018f739010108082913095551398
aa0105800018aaa9010108082913095551a19
aa0105800018aaa9010108082913095551a19
aa0105800018aaa9010108082913095551b1a
aa0105800018f73901010080829130955551cc8
aa0105800018aaa90001080829130955523eb
aa0105800018f7390001080829130955269b
aa0105800018f7390001080829130955269b
aa0105800018f7390001080829130955269b
aa0105800018aaa90001080829130955552c1b
aa0105800018f73900010080829130955552dc9
```

6.3.2.(B) IPICO SPORTS ELITE READER "10000" (RAW STREAMING) PORT

The IPICO Sports Elite Reader has options for three (3) other port connections specifically saved for the purpose of streaming separate data formats. The "10000," or "Raw Streaming" port streams tag read records for every tag read successfully made by the IPICO Sports Elite Reader.

To connect to the streaming port, open a Microsoft Telnet session window (method prescribed in section 6.3.2) and type the word "open" followed by a space, then the IP (Internet Protocol) address of the reader followed by another space proceeded by the number "10000," as pictured below:
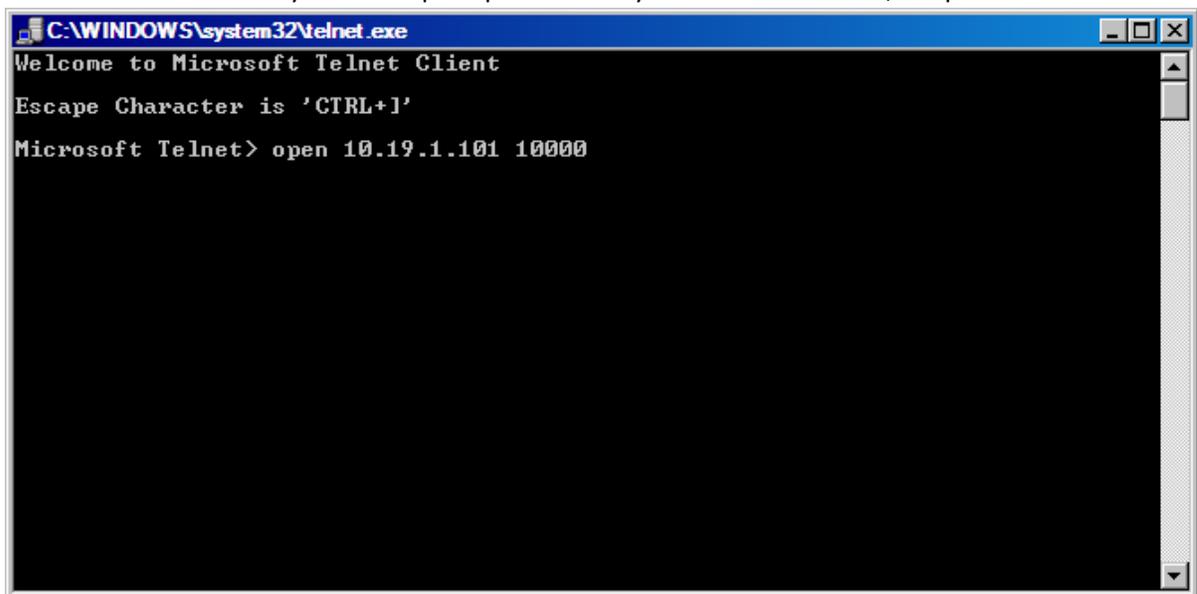
```
C:\WINDOWS\system32\telnet.exe

Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> open 10.19.1.101 10000
```

FIGURE – TELNET PORT "10000" SYNTAX

```
aa0105800018f7390101080082913095449a0
aa0105800018aaa90101080082913095449a0
aa0105800018f739010008082913095544e1f
aa0105800018f73901000080082913095545198
aa0105800018f7390101080082913095545bca
aa0105800018aaa90101080082913095545b1d
aa0105800018aaa90101080082913095503ea
aa0105800018aaa90101080082913095507ee
aa0105800018f73901010808291309550fca
aa0105800018aaa901010808291309551398
aa0105800018f739010108082913095551398
aa0105800018aaa901010808291309551a19
aa0105800018aaa901010808291309551a19
aa0105800018aaa901010808291309551b1a
aa0105800018f7390101080082913095551cc8
aa0105800018aaa90001080082913095523eb
aa0105800018f739000108082913095269b
aa0105800018f739000108082913095269b
aa0105800018f739000108082913095269b
aa0105800018aaa90001080082913095552c1b
aa0105800018f7390001080082913095552dc9
```

FIGURE 44 – "RAW STREAMING," "10000" PORT EXAMPLE

6.3.2.(C) IPICO SPORTS ELITE READER "10200" (FIRST-SEEN, LAST-SEEN) PORT

The IPICO Sports Elite Reader allows for truncated "FS,LS" ("First-Seen, Last-Seen") data to be streamed live from the reader unit. This data only records and outputs the first time a tag is recorded by the reader unit and the last time that a tag is recorded by a reader unit. The time between these record reports is, by default, five (5) seconds, but this timeout can be changed in the Webmin client (see 6.2.1).

To connect to the streaming port, open a Microsoft Telnet session window (method prescribed in section 6.3.2) and type the word "open" followed by a space, then the IP (Internet Protocol) address of the reader followed by another space proceeded by the number "10200," as pictured below:
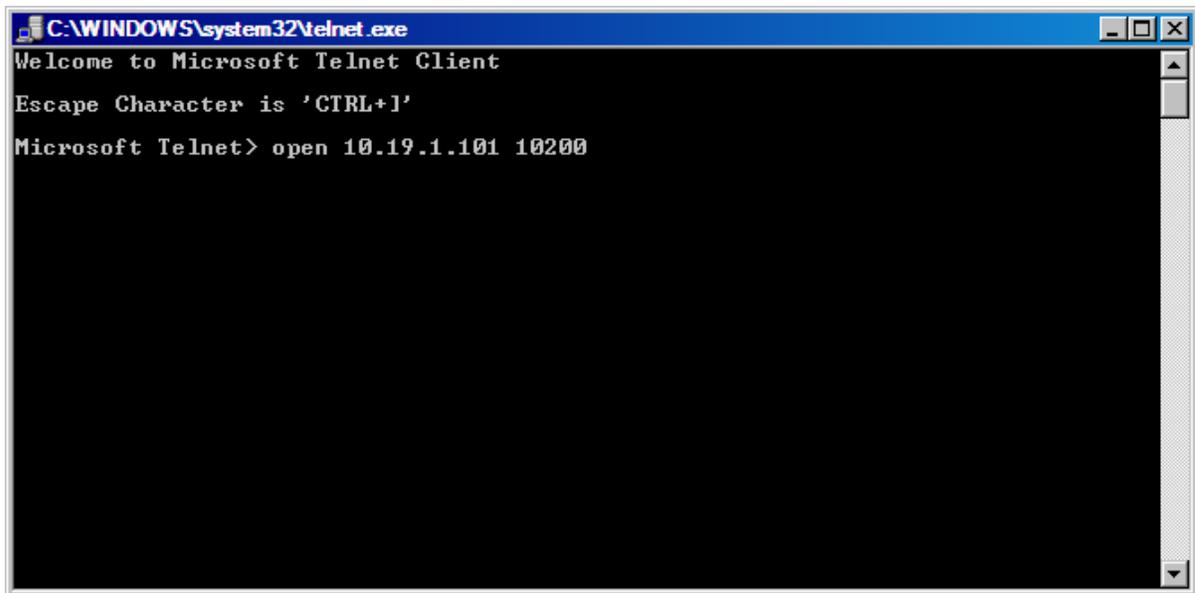
```
C:\WINDOWS\system32\telnet.exe                                    _ □ ×
Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> open 10.19.1.101 10200
```

FIGURE – TELNET PORT "10200" SYNTAX

The output of the "10200," or "First-Seen, Last-Seen" port is similar to that of the "10000" ("Raw Streaming") port pictured in section 6.3.2.(B). However, to clarify the record type, and "FS" is appended to the thirty-six (36) character string when the record is a "First-Seen" tag record and an "LS" is appended to the thirty-six (36) character string when the record is a "Last-Seen" tag record.
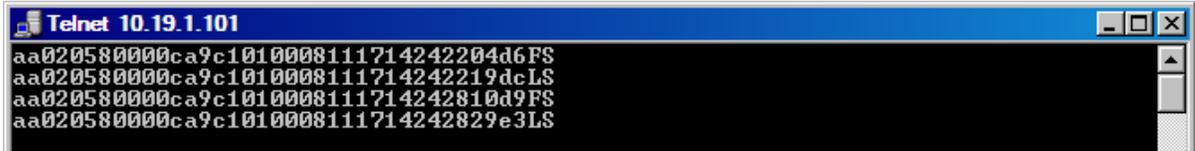

FIGURE 45 – "FIRST-SEEN, LAST-SEEN," "10200" PORT EXAMPLE

This data format is most helpful in determining true event starting time and event ending time. For starting lines, it is recommended that the "LS" ("Last-Seen") time is used. For finish lines and split locations, the "FS" ("First-Seen") data type is recommended.

6.3.2.(D) IPICO SPORTS ELITE READER "10201" (X.M.L. [EXTENDED MARKUP LANGUAGE]) PORT

The IPICO Sports Elite Reader also accommodates the X.M.L. (Extended Markup Language) data organization format. The "10201," or "X.M.L." port, streams the "FS,LS" ("First-Seen, Last-Seen," "10200") data type of "First-Seen" and "Last-Seen" records in a pre-formatted X.M.L. (Extended Markup Language) stream.

To connect to the streaming port, open a Microsoft Telnet session window (method prescribed in section 6.3.2) and type the word "open" followed by a space, then the IP (Internet Protocol) address of the reader followed by another space proceeded by the number "10201," as pictured below:
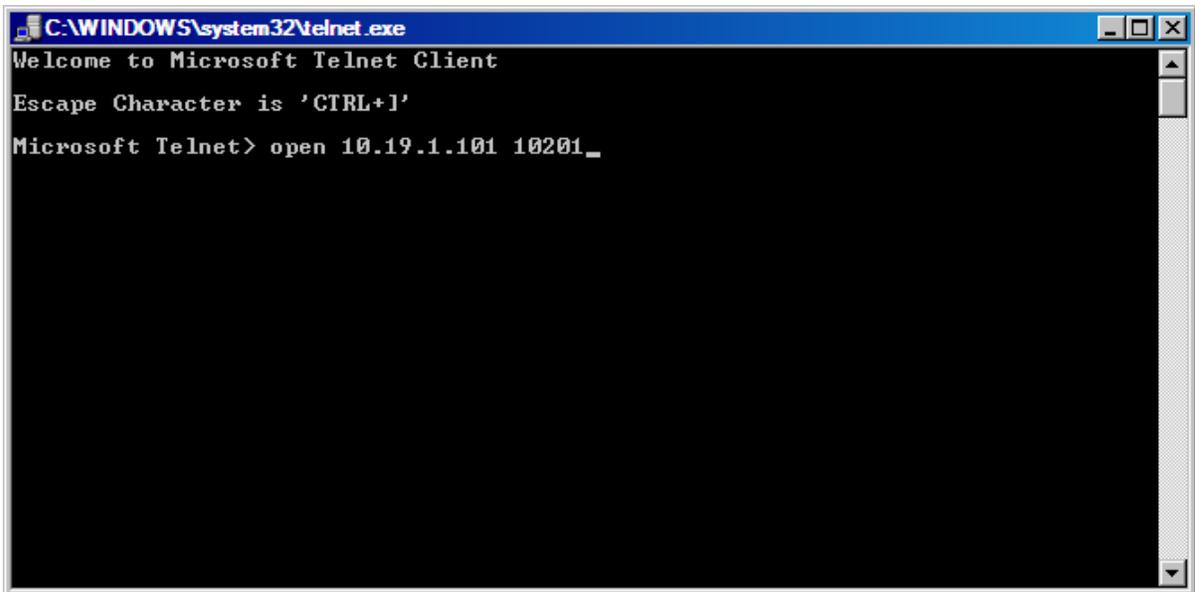
FIGURE – TELNET PORT "10201" SYNTAX

FIGURE 46 – "X.M.L.," "10201" PORT EXAMPLE

6.4 F.T.P. (FILE TRANSFER PROTOCOL)

The IPICO Sports Elite Reader contains a five hundred and twelve (512) M.B. (Megabyte) Compact Flash (C.F.) card for internal tag record storage. Two (2) methods exist for accessing this internal memory for file download before, after, or during an event. The first of these methods is outlined in section 6.2.4 (access through Webmin). The second option for reader access is through the IPICO Sports Elite Reader F.T.P. (File Transfer Protocol) port. While the Webmin allows access to this port, direct access can be obtained by opening an Internet browser (Internet Explorer, FireFox, Opera, et al.) and typing "ftp://" followed by the reader address (in this example, 10.19.1.101).

FIGURE 47 – F.T.P. (FILE TRANSFER PROTOCOL) ACCESS SYNTAX

Once the correct information has been entered, hit the "Enter" or "Return" keyboard key to open an F.T.P. (File Transfer Protocol) session with the IPICO Sports Elite Reader. Depending on the selected browser, the file list returned by the reader may appear differently, cosmetically, however, the list remains the same from browser to browser. The file list returned by the reader will look like the below-pictured F.T.P. (File Transfer Protocol) session:
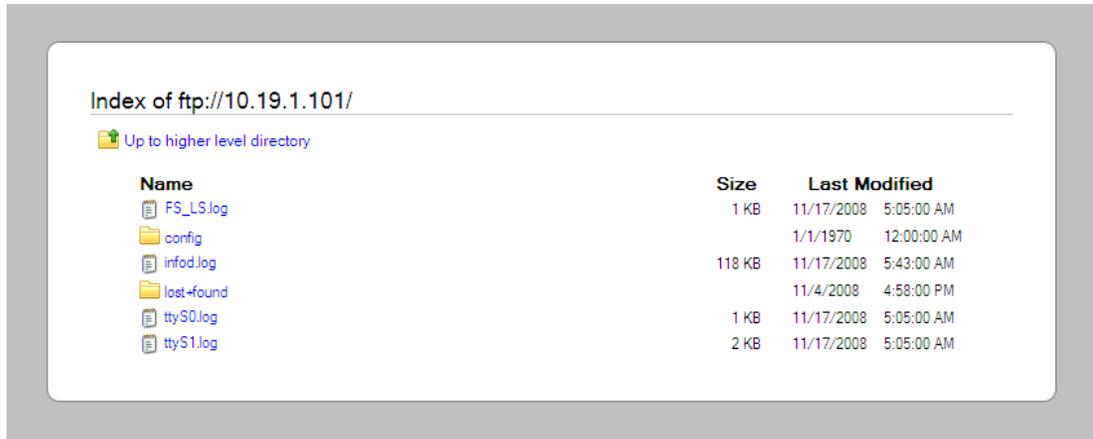
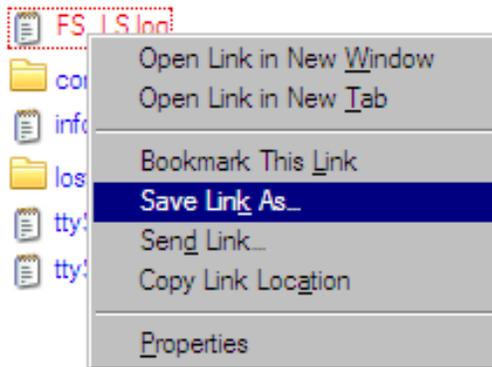**FIGURE 48 – F.T.P. (FILE TRANSFER PROTOCOL) SESSION SCREEN**

Each of the files listed in this file list view contain information specific to certain functions of the reader. The tag record files and their appropriate contents are delineated below:

FILE NAME	FILE CONTENTS
FS_LS.log	Log file of all output on the "10200," "FS,LS" port.
ttys0.log	Log file of all output from IPICO Sports Elite Reader, receiver 1 (left-most)
ttys1.log	Log file of all output from IPICO Sports Elite Reader, receiver 2 (right-most)

FIGURE 49 – SAVING F.T.P. (FILE TRANSFER PROTOCOL) FILES

To save a file from the F.T.P. (File Transfer Protocol) file list, right click on it and click "Save Link As…," "Save Target As…" or any variant presented by the web browser currently in use. The name of this option will vary depending on the web browser in use. Clicking this option will launch a dialog window prompting the user to specify a location for the file. Save the file where it can be readily accessed.

APPENDIX A – TAG DATA FORMATS

The IPICO Sports Elite Reader outputs different, but related, data formats. While more advanced documentation exists (available upon request), the information contained in this section provides an suitable intermediate background in the IPICO Sports Elite Reader IP-X protocol.

A.1   IP-X PROTOCOL: TAG RECORDS

Tag data records generated by the IPICO Sports Elite Reader are designated in the tag streaming files as those records that have a prefix (opening two [2] characters) of "aa." However, there are two distinctly different formats of tag records. The first of these records is a thirty-six (36) character string resident in the ttyS0 and ttys1 log files. The anatomy of this string is as follows:
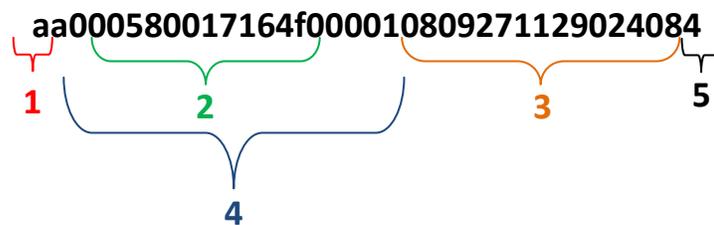
aa000580017164f000010809271129024084

1
2
3
5

4

1. "aa" – Tag Record Designation	4. "00…0001" – Receiver / IRQ ID
2. "0580017164f0" – Tag ID	5. "LRC" Checksum
3. "08092711290240" – Date/ Time	

1.   Tag Record Designation

The prefix of "aa" defines that the record being generated is that of a singular tag read.

2.   Tag ID

The IPICO Sports Sportag ID, "0580017164f0." This identification number is always a twelve (12) character string starting with "058." The Sportag production series identification number "0017," merely indicates the series of which this tag is a member.

3.   Date / Time

In the example tag string, the date (read from left to right) of "080927" (the first six [6] characters) shows the date to be September 29, 2008. The next eight (8) characters, "11290240" represent the time of day at which the tag was read by the IPICO Sports Elite Reader unit. The time string given in the example reads that this tag was "seen" by the reader at 11:29:02 (HH:MM:SS format). The additional two (2) characters, "40," are represented as hexadecimal digits representing the true "100th"s place. Decoded, the full time reads 11:29:02.64 (HH:MM:SS.MS format).
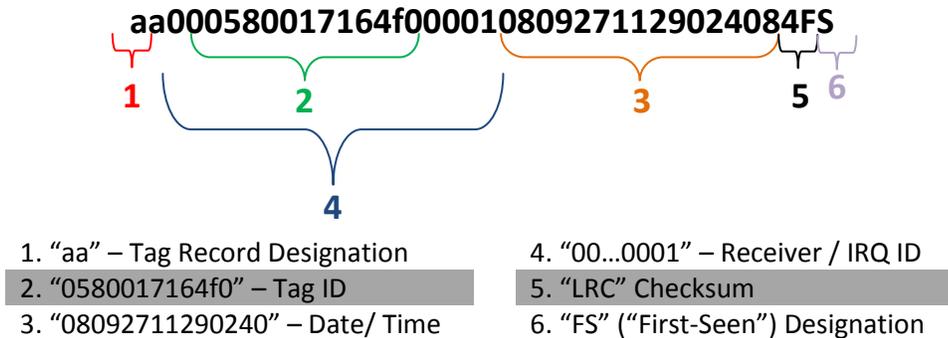
4.   Receiver / IRQ (Interrupt Request) ID

Mainly for programmatic use, this pair of ID numbers (represented as "01" and "0001," respectively) indicates the Receiver on which the tag was read ("01" – the left-most receiver) and the ID, where applicable, assigned to an interrupt request.

5.   "LRC" (Longitudinal Redundancy Check) Checksum

To ensure that the contents of the tag record are valid, the IPICO Sports Elite Reader performs mathematical verification of the contents of the tag record string. The IPICO Sports Elite Reader reports this "LRC" (Longitudinal Redundancy Check) checksum as the last two (2) characters.

The second tag record format, the "First-Seen, Last-Seen" tag record, does not change the internal makeup of the tag record, however the record will have "First-Seen" ("FS") or "Last-Seen" ("LS") status appended to it, making the tag record string thirty eight (38) characters.

aa000580017164f000010809271129024084FS

1   2   3   5   6

4

1. "aa" – Tag Record Designation   4. "00…0001" – Receiver / IRQ ID
2. "0580017164f0" – Tag ID   5. "LRC" Checksum
3. "08092711290240" – Date/ Time   6. "FS" ("First-Seen") Designation

1.   Tag Record Designation

The prefix of "aa" defines that the record being generated is that of a singular tag read.

2.   Tag ID

The IPICO Sports Sportag ID, "0580017164f0." This identification number is always a twelve (12) character string starting with "058." The Sportag production series identification number "0017," merely indicates the series of which this tag is a member.

3.   Date / Time

In the example tag string, the date (read from left to right) of "080927" (the first six [6] characters) shows the date to be September 29, 2008. The next eight (8) characters, "11290240" represent the time of day at which the tag was read by the IPICO Sports Elite Reader unit. The time string given in the example reads that this tag was "seen" by the reader at 11:29:02 (HH:MM:SS format). The additional two (2) characters, "40," are represented as hexadecimal digits representing the true "100th"s place. Decoded, the full time reads 11:29:02.64 (HH:MM:SS.MS format).

4.   Reciever / IRQ (Interrupt Request) ID

Mainly for programmatic use, this pair of ID numbers (represented as "01" and "0001," respectively) indicates the Receiver on which the tag was read ("01" – the left-most receiver) and the ID, where applicable, assigned to an interrupt request.

5.   "LRC" (Longitudinal Redundancy Check) Checksum

To ensure that the contents of the tag record are valid, the IPICO Sports Elite Reader performs mathematical verification of the contents of the tag record string. The IPICO Sports Elite Reader reports this "LRC" (Longitudinal Redundancy Check) checksum as the last two (2) characters.

6.   "FS" ("First-Seen") Designation

The "First-Seen" Designation given to the sample tag data indicates that this tag read was the first read of the specific tag in question ("0580017164f0") that the reader has seen. If the tag data were appended with "LS" ("Last-Seen"), it would indicate that the record was the last time at which the sample tag ("0580017164f0") was last seen.

A.2 IP-X PROTOCOL: DATE-TIME FORMAT

The IPICO Sports Elite Reader also uses another record type to differentiate Date-Time functions and notifications from tag record notifications. Prefixed with "ab" instead of simply "aa," these records report the reader's internal time and date and are recorded in ttys0.log, ttys1.log and FS_LS.log.

ab010a2c0811180212153062f102a9

1

2

3
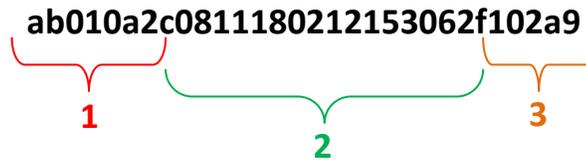
    1. "ab010a2c" – Date-Time record Designation   3. "f102a9" – "LRC" Checksum
    2. "0811180212153062" – Date-Time value

1. Date-Time record Designation
The "ab010a2c" leading the string signifies the record type, in this case a reader report record "ab," that is a timestamp "a2c."
2. Date-Time value
The Date-Time value "0811180212153062" represents different portions of the reader's internal date and time. The "081118" represents that the IPICO Sports Elite Reader's internal time listed in the order of YYMMDD. Thus, it is November 18, 2008. The "02" proceeding the date signifies that the day of the week is the second (2nd) day, or Tuesday. "12153062" represents the IPICO Sports Elite Reader internal time. In this case, the string is formatted HHMMSS(MS). Thus, the time of day is 12:15:30 P.M. The "62" represents the reader's resolution to the hundredth of a second, and is encoded as a hexadecimal number. When translated to decimal format, the time reads 12:15:30.98. Thus, the internal reader time and date is Tuesday, November 18,2008 at a time of 12:15:30.98 P.M.
3. "LRC" (Longitudinal Redundancy Check) Checksum
To ensure that the contents of records are valid, the IPICO Sports Elite Reader performs mathematical verification of the contents of the timestamp record string.