CSAFE PROTOCOL TECHNICAL CERTIFICATION TRAINING

Field Engineering | 2010

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Course Objectives

- What is CSAFE?
  - Brief introduction
- CSAFE Port vs. Serial Port
- FitLinxx Terminology
- Fitness Equipment Networking Setup
- Other Uses of the CSAFE Port
- Your Responsibilities when Troubleshooting with Third Party Solutions
- Suspected CSAFE Port Failure, Specific Troubleshooting Steps
- Software Update via CSAFE Port
  - Products NOT Supporting Software Updates via CSAFE Port
  - Products Supporting Software Updates via CSAFE Port
  - Methods Used to Update Software

What is CSAFE? – brief introduction

- It is a network protocol used to connect exercise machines into a functioning network that allows for:
  - **Sending workout presets** to the exercise machine from the server,
  - **Sending workout results** from the exercise machine back to the server (the server logs the data for the user).
- CSAFE: **C**ommunications **S**pecification for **F**itness **E**quipment
- The following manufacturers contributed to creating the protocol: Precor, Quinton (Stair Master), Schwinn, Stair Master, Star Trac, Tectrix (Cybex), Trotter, Life Fitness, and FitLinxx.
- FitLinxx is the provider of the networked solution (server, cabling, and wireless subsystems).
- The protocol works with either the wired or the wireless network.
- Life Fitness' designs go through a certification process whenever they are intended to be used with the FitLinxx network.

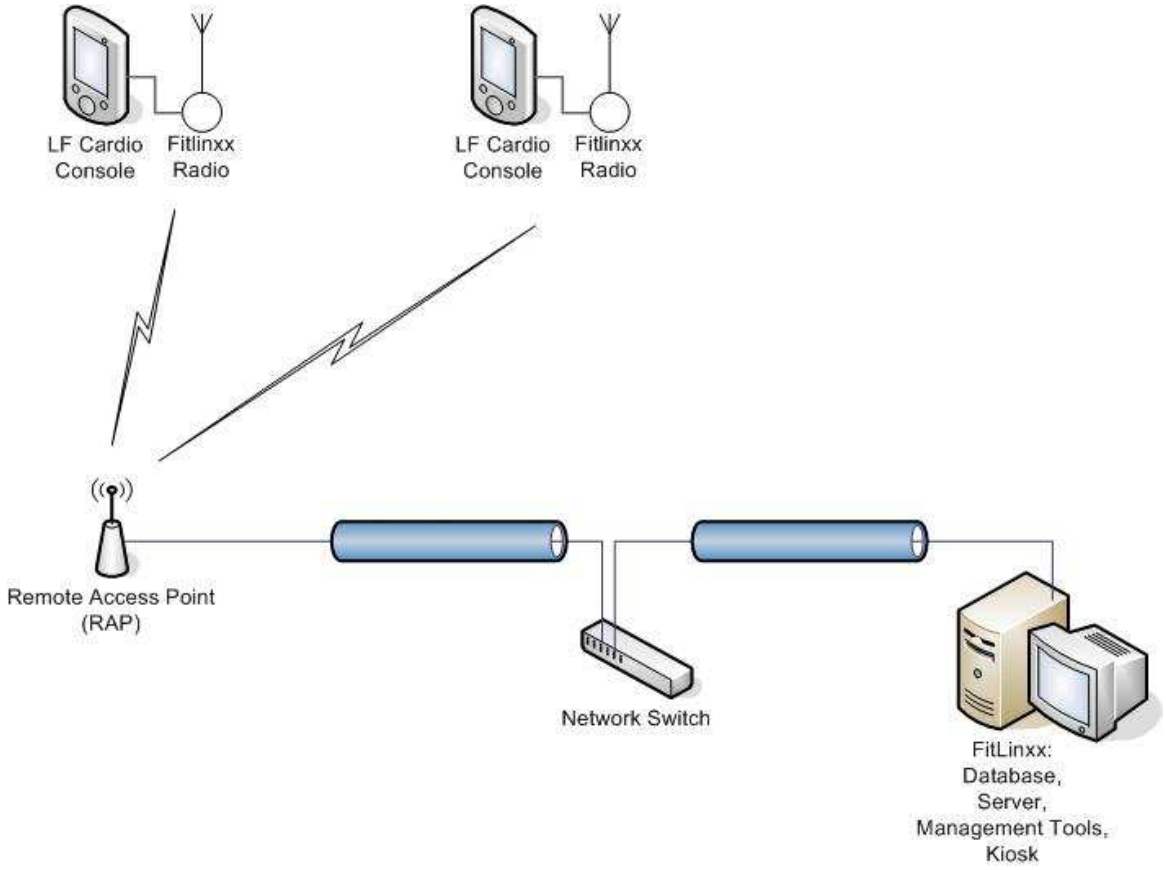
CSAFE Port vs. Serial Port

- Serial Port: any port allowing for serial communication of a predefined format (including CSAFE).
- CSAFE Port: a serial port supporting the CSAFE standard.
- Not every serial port is a CSAFE Port.
- The details of the CSAFE standard are not in scope of this training.

FitLinxx Terminology

- **FitLinxx Radio**: A transceiver, an interface between a Remote Access Point (RAP) and the Life Fitness' CV CSAFE port.
- **RAP** (Remote Access Point): A transceiver, used as interface between FitLinxx Radios and the wired LAN.
  - Transceiver (TRX): a device that has a transmit and receive capability.
- **Network Switch**: in simple terms it is a device that connects many devices to a single point of contact.
- **Database**: a data storage device that in case of FitLinxx stores user data such as: age, preferred speeds, incline, level, and other parameters used to set up a workout.
- **Server**: a computer that receives requests from the devices connected to the network to retrieve and collect data (in the database) based on user's PIN.
- **Kiosk**: a computer that might be separate from the server which allows a user to log in to the FitLinxx network

Fitness Equipment Networking Setup



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Other Uses of the CSAFE Port

- CSAFE serial port can also be used as a **power source**.
- The CSAFE standard describes the voltage and current requirements.
  - If the device violates the requirements the networking functionality may be impaired (intermittent or not working at all)
  - Vsource = [4.75, 10.0]Vdc
  - Imax = 85mA (nominal)
- Excessive current draw will cause intermittent failures of the system (console + “the thing”@CSAFE).

Your Responsibilities when Troubleshooting with Third Party Solutions

- You are not required to troubleshoot FitLinxx network setup.
- Is the problem on the end of our console or the device connected to it?
  - Ask specific questions like:
    - Does the setup need to follow directions outlined in the Life Fitness' Service Bulletin number EC09020201N, subject: *Elevation Series Consoles, Console Setup for FitLinxx Network, Issue with Self Powered Consoles' Communication with FitLinxx*.
    - Is the power being delivered from the CSAFE port?
    - Does the diagnostic loopback test complete successfully?

NOTE:
Both questions related to power and loopback tests are discussed next.

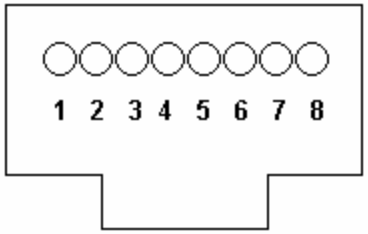
Suspected CSAFE Port Failure, Specific Troubleshooting Steps

- Suspected failures:
  - Self-powered Elevation Series LCD Console does not boot
    - Read bulletin # EC09020201N; title: Elevation Series Consoles, Console Setup for FitLinxx Network, Issue with Self Powered Consoles' Communication with FitLinxx
  - No power on pin 5 of the CSAFE port
    - Plug in the CSAFE LOOPBACK TEST CABLE (AK86-00026-0000), observe if the cable's LED turns on.
    - The above cable will not indicate if the voltage is proper, you have to measure the voltage using the volt meter

Suspected CSAFE Port Failure, Specific Troubleshooting Steps

- Suspected failures:
  - No power on pin 5 of the CSAFE port (continued)
    - Voltage measurement

- Pin positions are counted from 1 to 8 in a left to right direction looking into the RJ-45 socket with the locking tab facing down as shown in the following diagram



Pin	Description	Fitness Equipment (Slave) I/O
1	Audio Left	Input
2	Audio Right	Input
3	RX	Input
4	TX	Output
5	Voltage Source	Output
6	CTS Flow Control	Input
7	Signal Ground	N/A
8	Shield	N/A

Suspected CSAFE Port Failure, Specific Troubleshooting Steps

- Suspected failures (continued):
  - Console unable to receive user's presets (usual setup is the FitLinxx network).
    - Make sure that the hardware is still functional – execute the checks outlined above:
      - Plug in the CSAFE LOOPBACK TEST CABLE (AK86-00026-0000), observe if the cable's LED turns on
    - Enter Loopback Diagnostic state (see respective service manual for instructions), observe if the test completes successfully (LOOPBACK TEST CABLE must be plugged in prior to executing the test).

Note:

Successful completion of the above two steps points to the fact that the CSAFE port works well. Voltage levels and current sink limit had been tested by design engineering prior to product's release.

Products Supporting Software Updates via CSAFE Port

- In general any LED designs are upgradable via the CSAFE serial port.

Products NOT Supporting Software Updates via CSAFE Port

- In general any LED designs that do not have a CSAFE serial port.
- None of the LCD products (including 12” Integrated, and 7” / 15” Elevation series) are updatable in field using the CSAFE port.
- Consoles that use an EPROM as the program memory– must be updated by swapping EPROMs.

Methods Used to Update Software

- The consoles that support the software updates via the CSAFE port can be updated using two methods:
  - By a Widget Box (Legacy Method, covered in a separate presentation),
  - By a PC Application (covered in a separate presentation)

Summary

- In this presentation we had discussed the following:
  - Defined CSAFE
  - CSAFE Port vs. Serial Port
  - FitLinxx Terminology
  - Fitness Equipment Networking Setup
  - Other Uses of the CSAFE Port
  - Your Responsibilities when Troubleshooting with Third Party Solutions
  - Suspected CSAFE Port Failure, Specific Troubleshooting Steps
  - Software Update via CSAFE Port

Questions

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