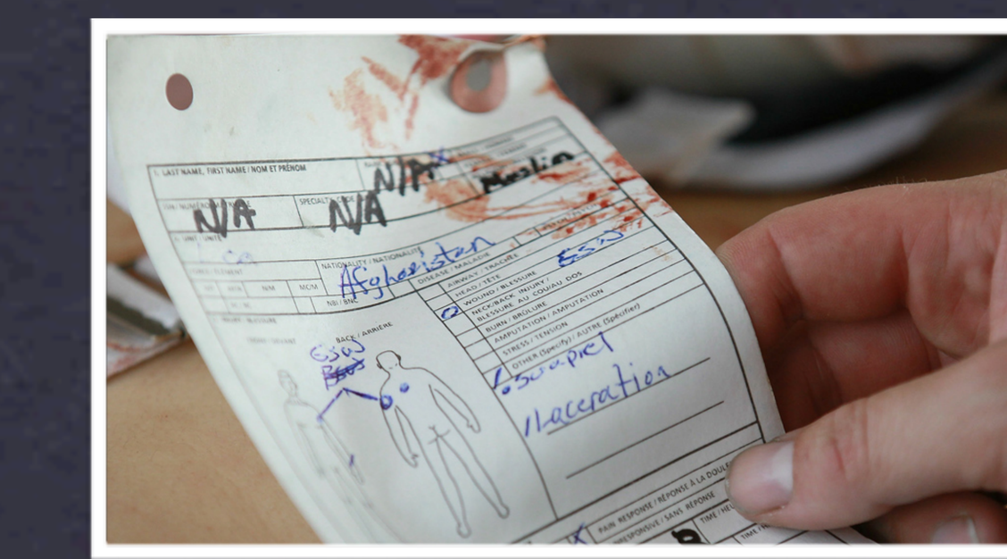
Ultra-Wide Band Close Area Network for SNC's Transport Telemedicine System



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Project Abstract

Currently, the Transport Telemedicine (T2) program of Sierra Nevada Corporation is a cutting-edge commercial and military system solution designed to capture critical patient care information throughout the medical transport and care of a wounded individual. Such information gathered as close to the point of injury as possible immeasurably increases quality of care available to the patient.

In conjunction with SNC, Team 12 designed and developed an ultra-wideband, high security, close area network, which satisfies strict range, performance, stealth, and exploitation requirements and constraints.

The system incorporated a physical networking connection between digital medical monitoring devices, SNC's embedded mobile access point computer, and an end-user console computer system. This network has at least one wireless link relying on the merits and capabilities of ultra-wide band wireless technology. The design and implementation of a software application suite to demonstrate these critical data transfer capabilities constituted a significant portion of the project.

Description

Intended Users & Key Usability Goals

The intended audience and use for this project is wireless data transfer in military and civilian medical transport vehicles, including ambulances, UH-60 Medevac helicopters and C-130 transport aircraft. Specifically, this system was designed for use in SNC's Transport Telemedicine program, allowing emergency medics to gather critical patient data in real-time and transmit to hospitals without interrupting patient care or compromising the security or safety of the transport vehicle.

Within the confines of this use, this solution has multiple benefits over existing solutions, being less detectable, fully autonomous, and more secure.

The system is designed for the following intended users and goals:

- SNC T2 program users, for the purpose of extending current product capabilities and marketability.
- Combat medics and other emergency response personel, as end-users for the purpose of giving them the ability to capture patient vital sign data in a more efficient manner.

Main Functionality & Characteristics

A controlled-environment network of medical devices (real and simulated), interface adapters, computers and access points was developed such that digital information may be gathered from the devices to the computers and made available for further transportation outside the CAN.

Software on the computers and access point was designed to autonomously monitor and manage the CAN and handle the transmission of data from a variety of medical devices, and to demonstrate system capabilities.

Conclusions

The key to the success of this project is an innovative assembly of a wide range of cutting-edge technologies.

This UWB CAN has clear potential for permanent inclusion as part of the existing Transport Telemedicine market solution from SNC.

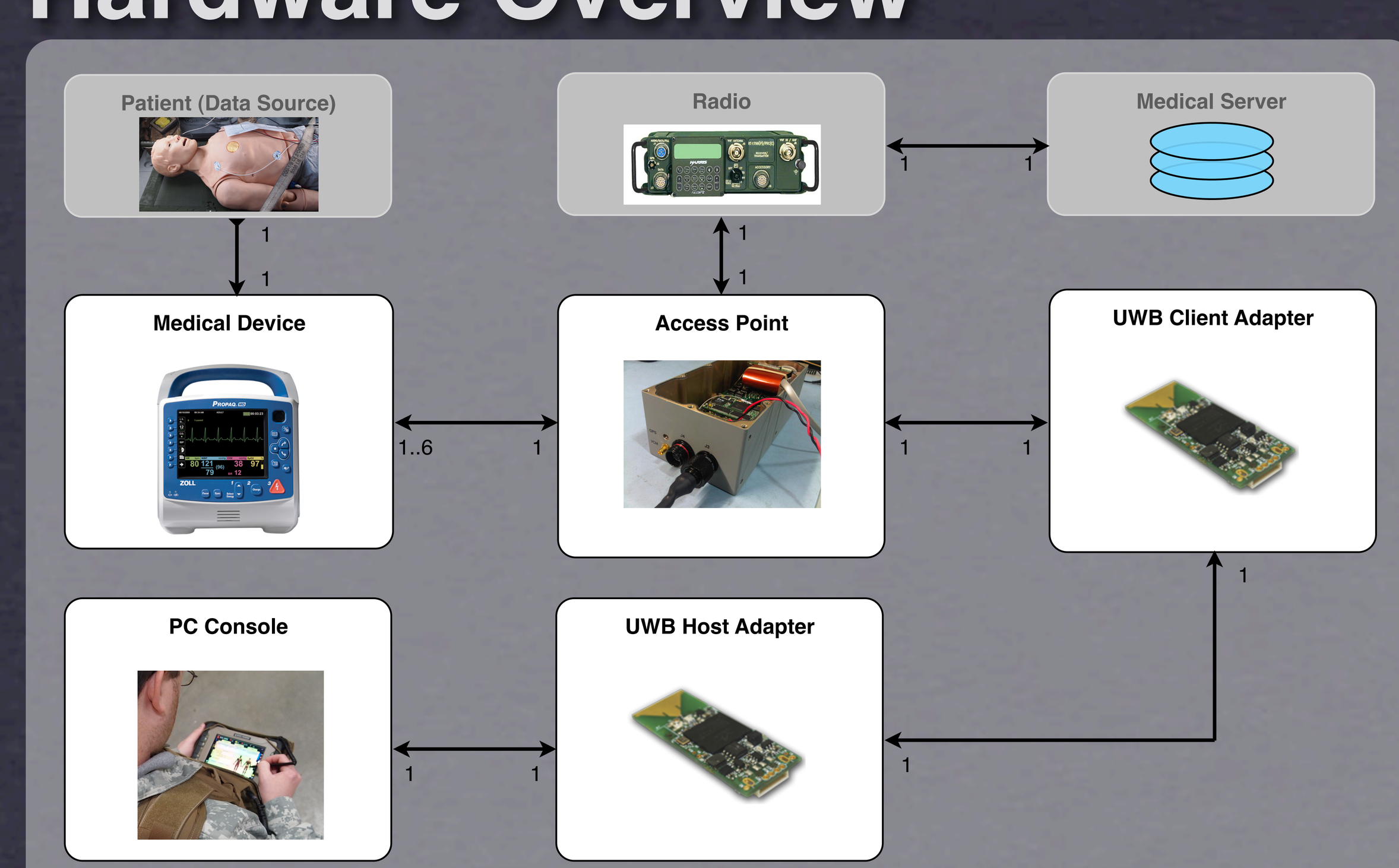
Beyond the military medical field, this project has yielded certain advancements and capabilities useful in similar applications, where secure and high-speed local wireless transfer of data is advantageous, such as heavy equipment monitoring stations, secure wireless connections within banking and government institutions, and small-scale sensor networks.

Future Work

It should be the intent to deploy the most robust cryptosystem available due to the steep security needs of the system. To gain full benefit of the system, existing and future medical monitoring equipment should be overhauled to integrate UWB networking capabilities alongside traditional wired connections.

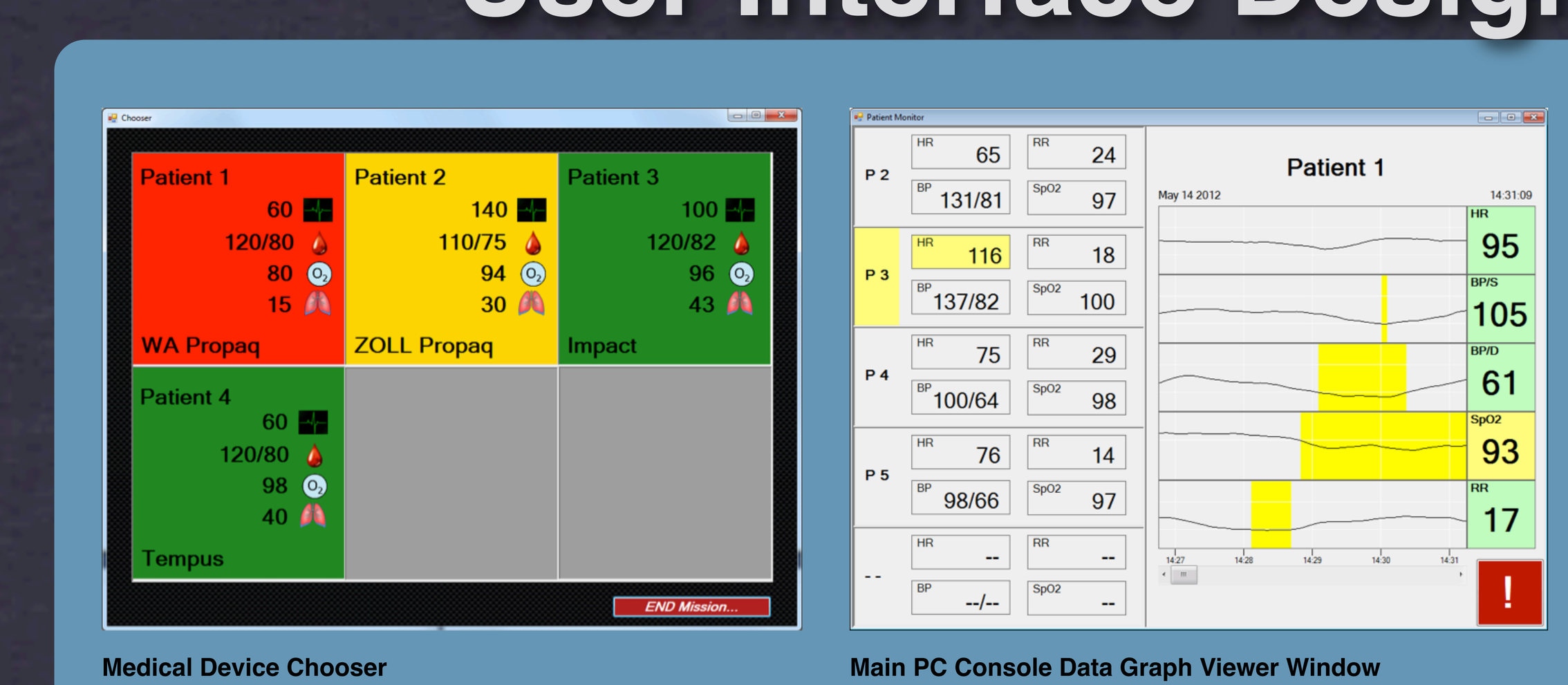
Architecture and Design

Hardware Overview



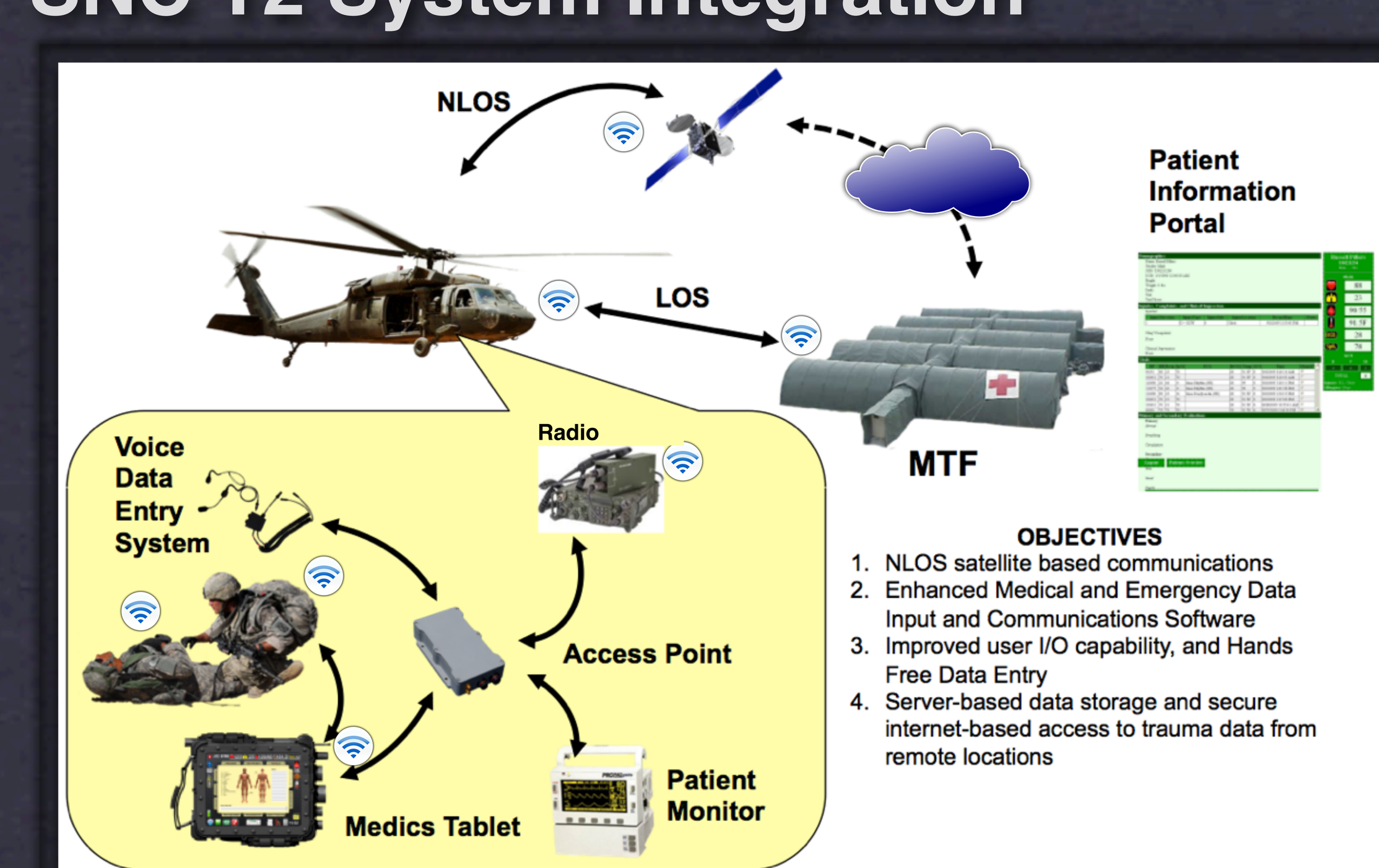
Basic T2 Data Flow

User Interface Design

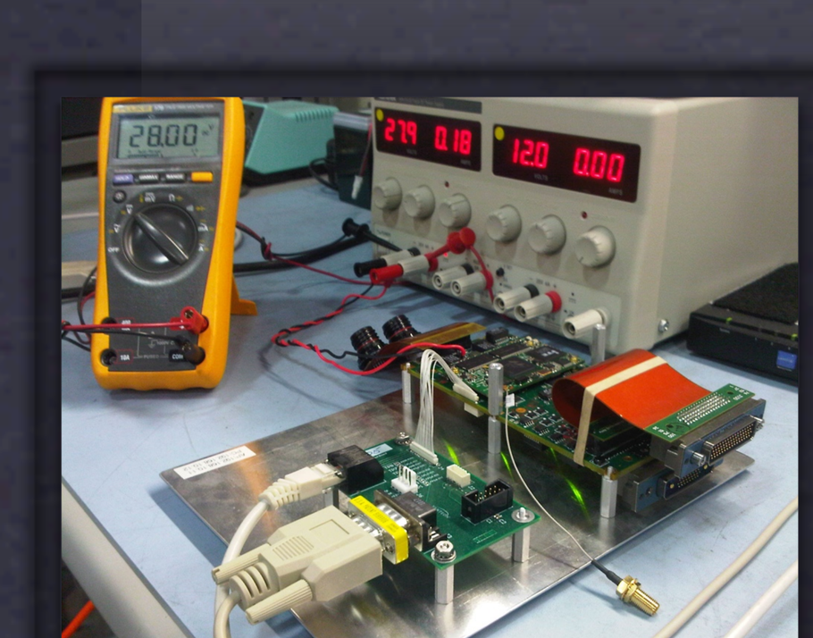


Target Machine (Wearable Ruggedized PC)

SNC T2 System Integration

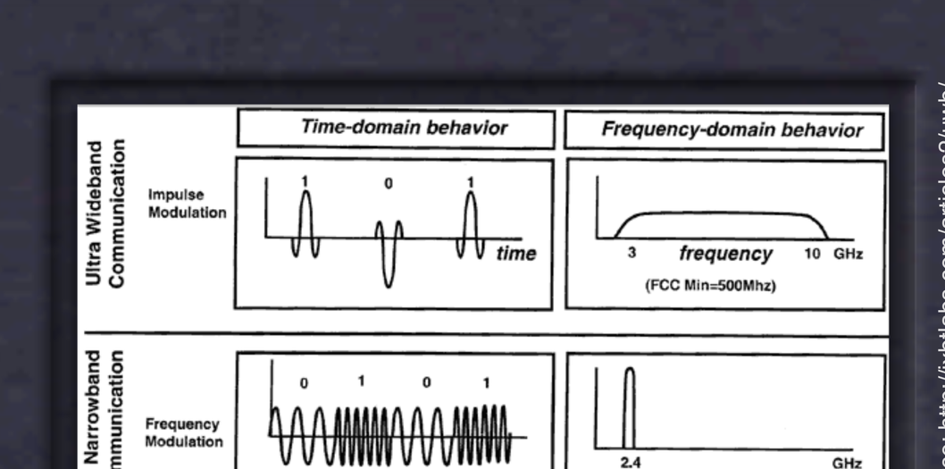


T2 System In-flight



Embedded SNC Access Point

Ultra-Wide Band Hardware



Ultra-Wide Band Characteristics

Simulated Medical Treatment Facility

Typical Transport Vehicle Environment (UH-60 Blackhawk Helicopter)

Developed under SNC advisement.

SIERRA NEVADA CORPORATION
ELECTRONIC SYSTEMS AND INTEGRATION
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