WiMAX Enabled Ambulance

By
Arjita Chawla

Presentation Outline

- 911 Stories/Statistics
- What's the IDEA
- Current Implementations
- What is WiMAX
- Ambulance Design
- Advantages of WiMAX
- Conclusion

911 stories

- On average, three callers per day wait two minutes or longer for 911 to answer the phone.
- Deciding whether EMS,Police or fire dept is required
- Delays in getting to location of the incident

Statistics – EMS calls on a rise

- Americans place an estimated 200 million 9-1-1 calls each year (NENA, 2004).
- An estimated 85 percent of those calls are directed to the police, while the remaining 15 percent are divided between fire departments and EMS (NENA, 2001).
- *In recent years, the number of EMS calls relative to fire department calls has been increasing.*
- According to the National Fire Protection Association, 80 percent of fire service calls are EMS-related (National Fire Protection Association, 2005)

The idea ?

The IDEA

- To help overcome and not further delay assistance needed by the patient.
- Have a WiMax enabled ambulance that will transmit patients information to the hospital for physicians view
- To design a system that works in tandem with the existing systems and makes use of the WIMAX technology
- The ambulance hasn’t been created real time ,it’s an idea involving the upcoming technology –WIMAX

Current Practice

- 2 way radios (UHF/VHF)
- GSM
- 3G-based wireless networks

wimax

What is WiMax ?

- **W**orldwide **I**nteroperability for **M**icrowave **Acc**ess (WiMax) .WiMax implements the IEEE 802.16 standard,
- Expected to be the next generation high speed wireless broadband connection enabler. WiMax is considerably faster than any current wireless solutions and covers a greater range.
- WiMAX can potentially erase the suburban and rural blackout areas that currently have no broadband Internet access because phone and cable companies have not yet run the necessary wires to those remote locations
- A computer equipped with WiMAX would receive data from the WiMAX transmitting station, probably using encrypted data keys to prevent unauthorized users from stealing access.
- Can handle 70 megabits per second

Mobile WiMAX = Mobile Internet / Personal Broadband Services

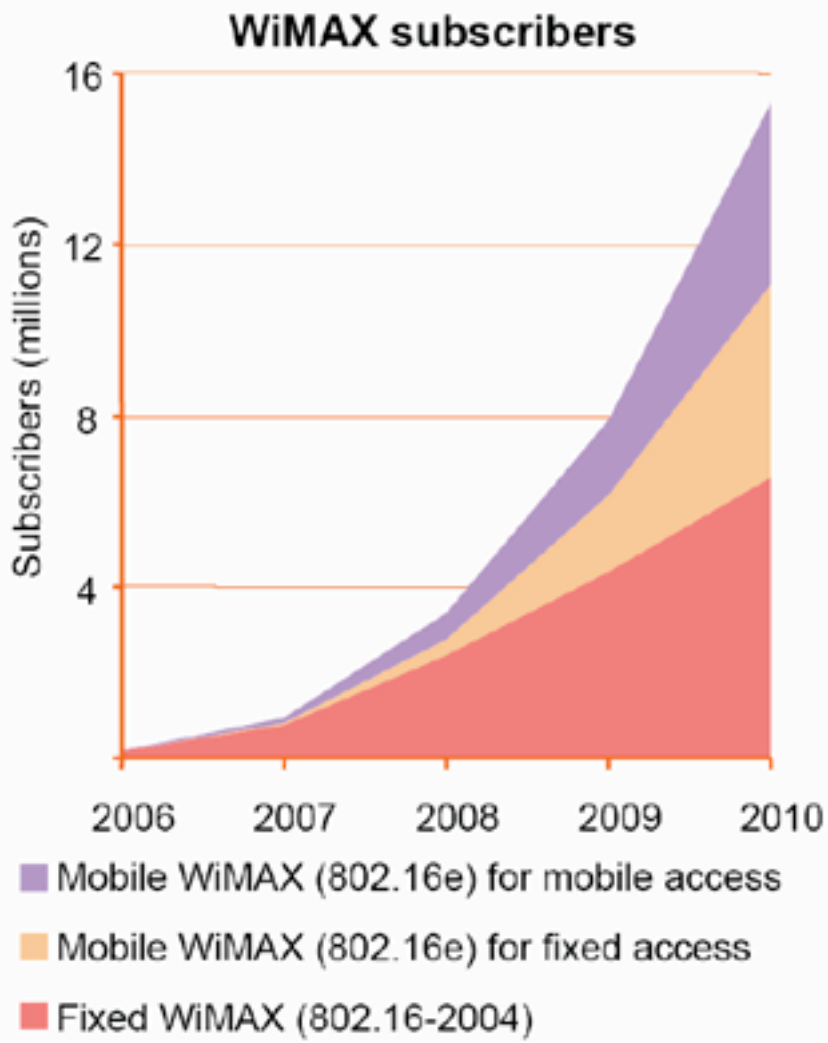
- **Take the Internet to where Cellular took voice**
  - 1985: voice at home, voice at work
  - 1995: cellular voice everywhere

- 27% of the 160 million PCs sold in 2004 were laptops
- 2005 milestone >50% of US PCs are laptops
- 90% of new laptops are WiFi-ready
- US Broadband penetration 43% Jan 2004

  - 2005: Internet at home and at work (broadband)
  - 2010+: Internet everywhere

Affordable multi-Mbps Personal Internet Everywhere

Market potential

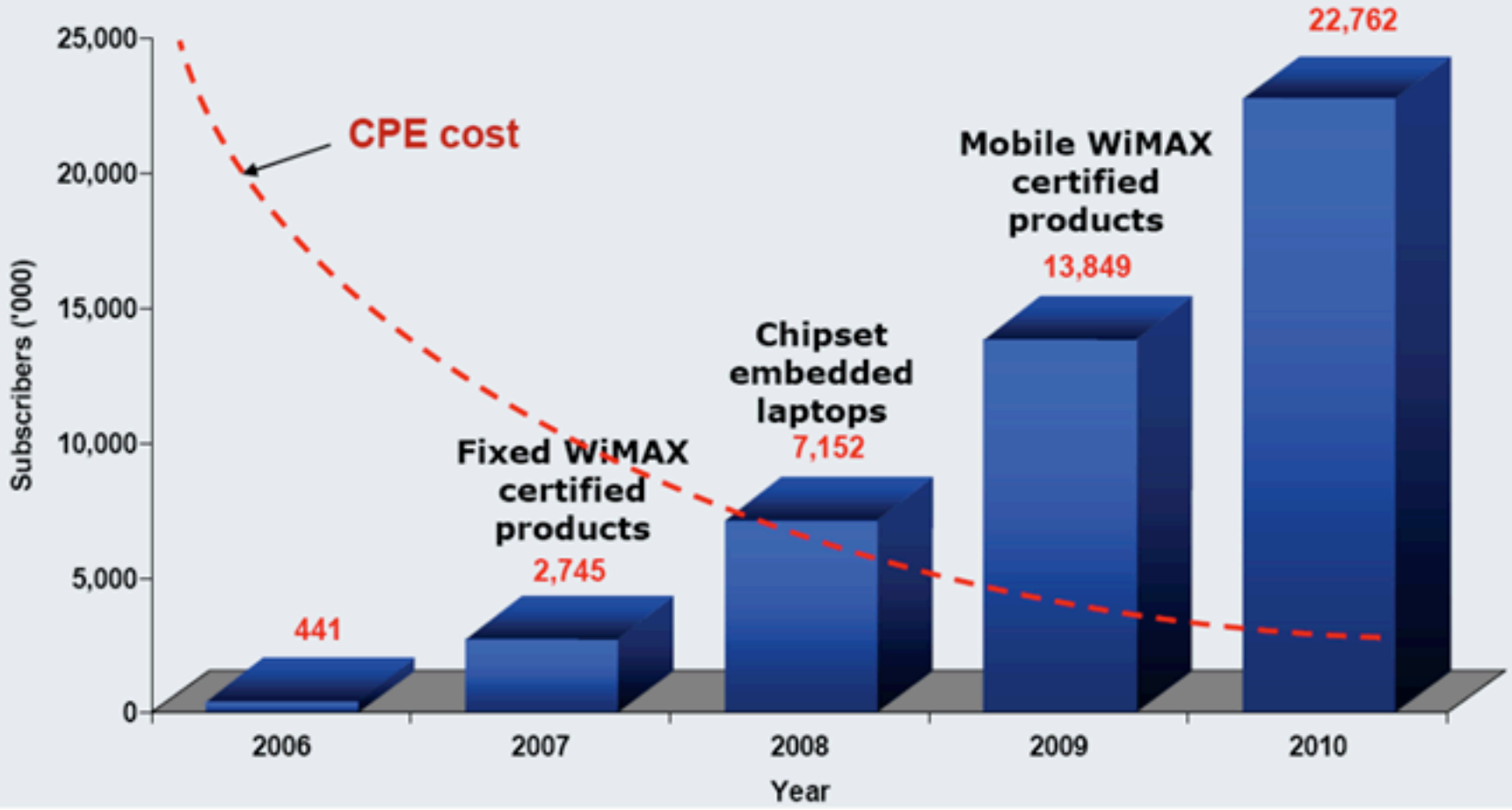


Source: Senza Fili, May 06

- Mobile WiMAX can be used for both fixed and mobile access
  - Initially fixed access will dominate, as mobile devices will be introduced later
  - In the long term, mobility will become more important
- The distinction between fixed and mobile access will disappear with personal broadband services
- Fixed WiMAX addresses the demand for fixed-only deployments

Inflection Point

Mass adoption of WiMAX is expected to take place post 2008 when chipset embedded laptops and CPE cost drop to more affordable level

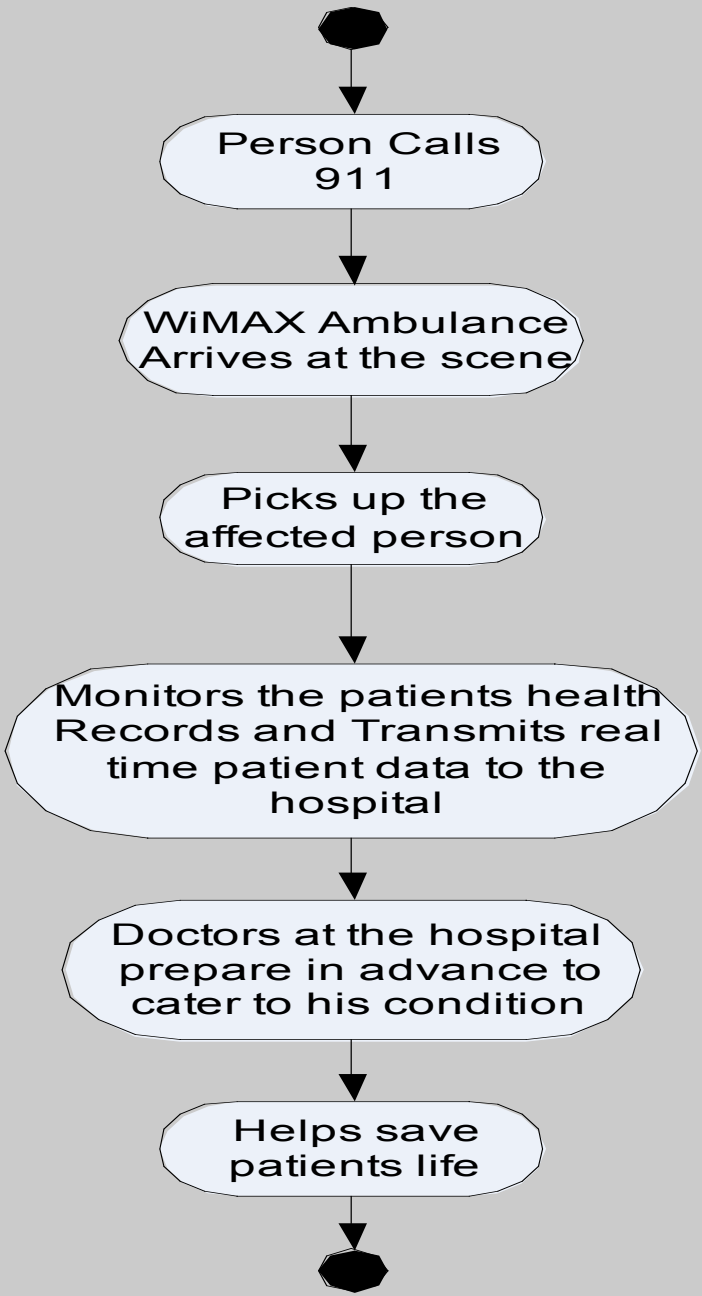


Source: Frost & Sullivan, April 06

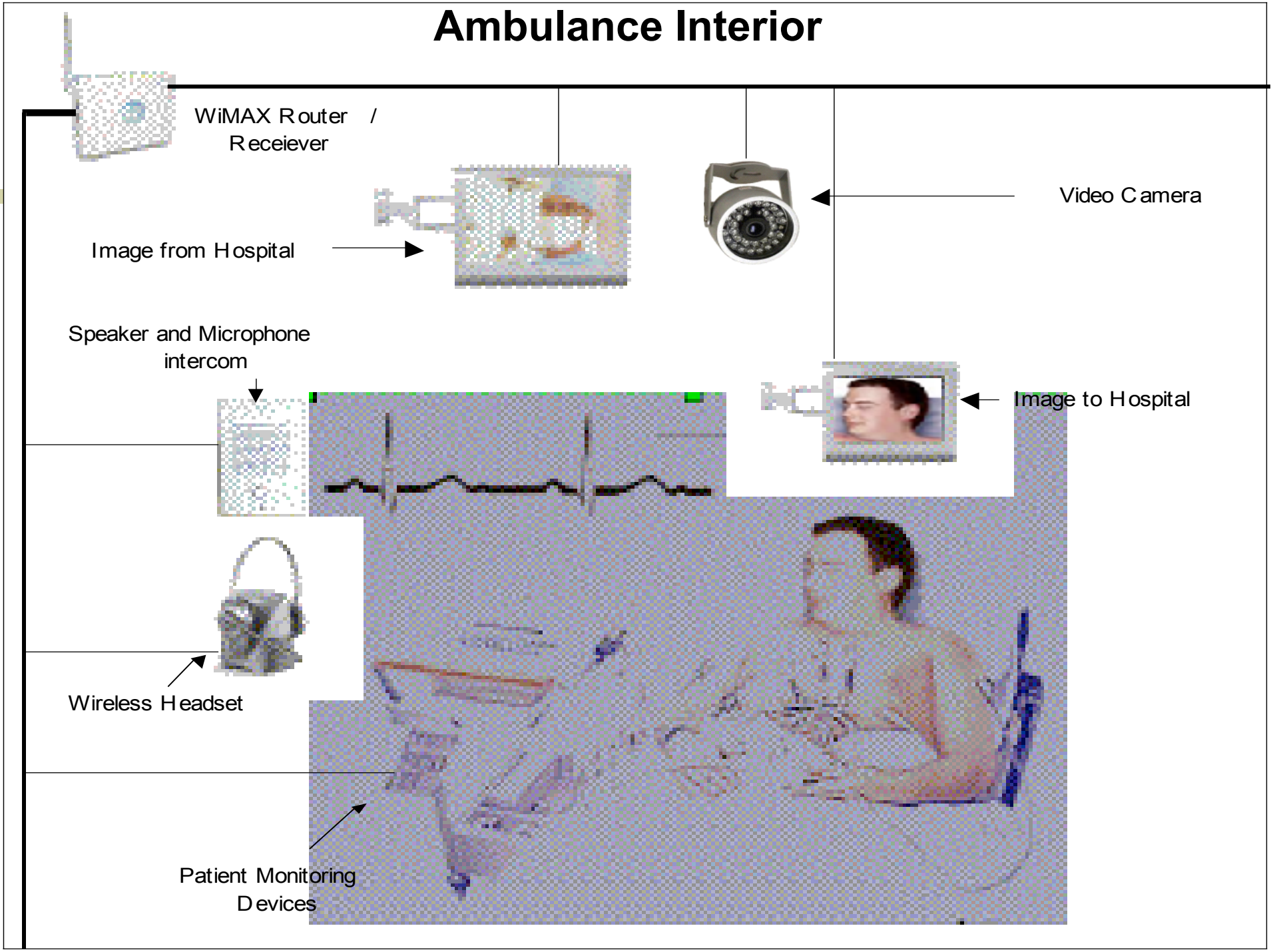
Why WiMax

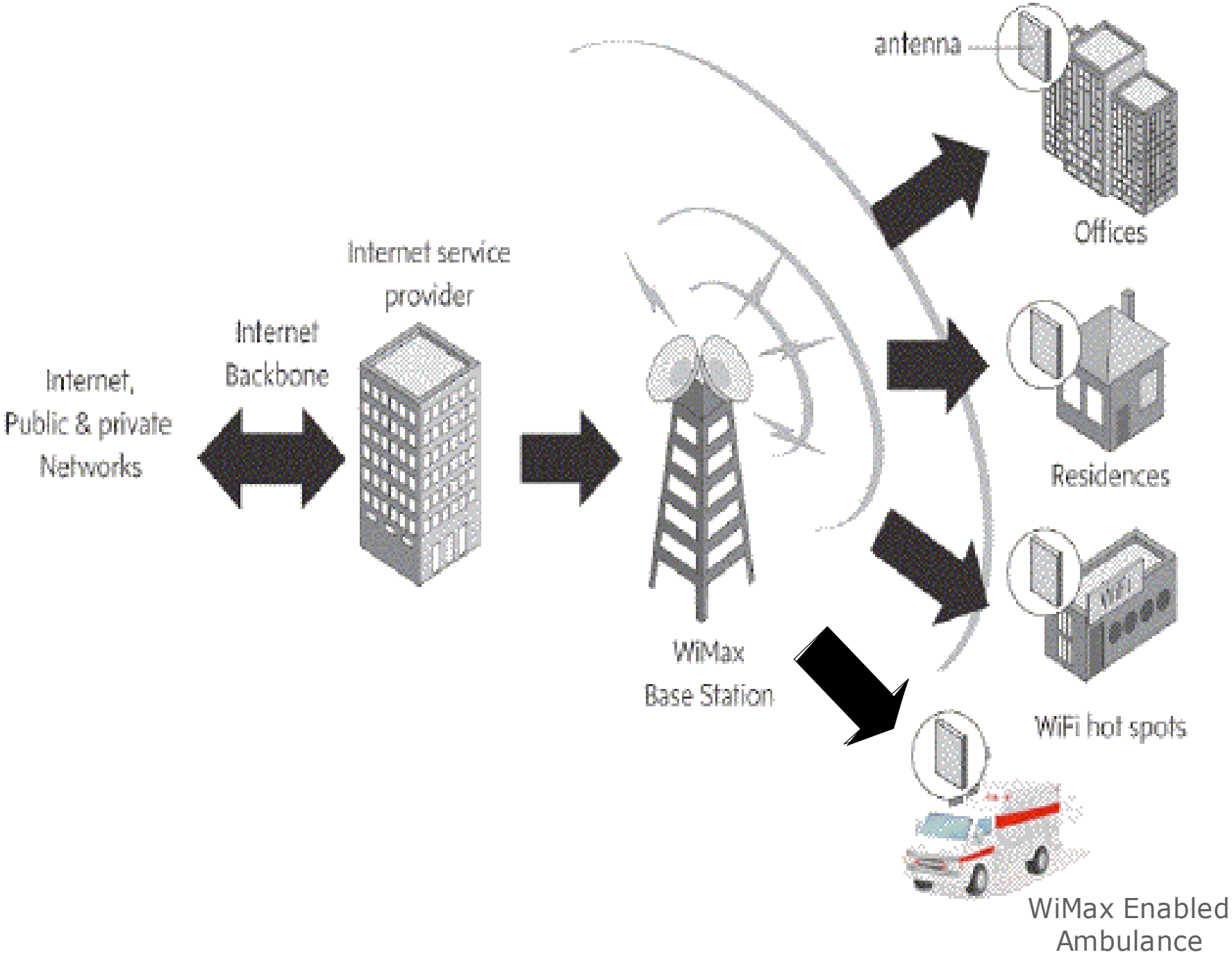
- The rich nature of the medical information that needs to be transferred from the patient to the healthcare provider.
- Data, as well as the operating environment, can be different for various medical scenarios.
- Many applications may require bandwidth-hungry data such as images or real-time video.
- Transmitting multiple streams together - Telemedicine systems often transmit different types of streams simultaneously, such as realtime video, images, vital signs, or other readings from medical sensors.
- Robust security features
- Good Quality of service

Activity Diagram



Ambulance Interior




antenna
Offices
Internet service provider
Internet Backbone
Internet, Public & private Networks
Residences
WiMax Base Station
WiFi hot spots
WiMax Enabled Ambulance

Benefits

- Facilitate immediate exchange of information in the ambulances when on the road
- Enable early diagnosis, intervention, and treatment in certain events.
- Providing the in-hospital team with a better advanced understanding of the patient's condition, thereby enabling them to be better prepared to provide effective interventions.
- Avoiding unnecessary delays by by-passing the Emergency Department and taking critically injured patients directly to the operating room, ICU, CT scanner, etc.
- Providing the EMS team with expert opinions on complex trauma injuries from in-hospital physicians
- Reducing the time needed in handing off the patient from the EMS team to the in-hospital team

Supported Features

- Easy-to-use interface – the system should provide simple interfaces for the health service provider
- Controllability – the system should enable remote control functions.
- Media adaptability – the system should provide support for different medical system, such as vital biosignals, images, video, and patient information

- (WiFi Vs WIMAX)
  - Connection with WiMax has faster and more stable responses.
  - Provides more coverage compared to WiFi
  - WiMax supports much many more users than Wi-Fi. We can see that, although the speed for each user similar, but WiMax's biggest advantage is it can support more users.
  - Wifi focuses on LAN while Wimax focuses on MAN
- (3G Vs WIMAX)
  - Offers lower equipment complexity
  - Simpler mobility management as compared to 3g networks.
  - 3g is slower and fluctuant
  - WiMAX is open standard which means there would be no or little royalty

Conclusion

- WiMax can be a boon to providing patients with prompt assistance.
- Real time life saving data transfer becomes more reliable and faster
- Overcomes geographical limitations