



Medical Grade Wireless Utility Case Study for Hospitals

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West Wireless Health Institute

Independent, nonprofit medical research organization launched in March 2009, funded by the Gary & Mary West Health Foundation



**Primary mission is to
lower health care costs**

Wireless Health Enabled

**Infrastructure
Independence**

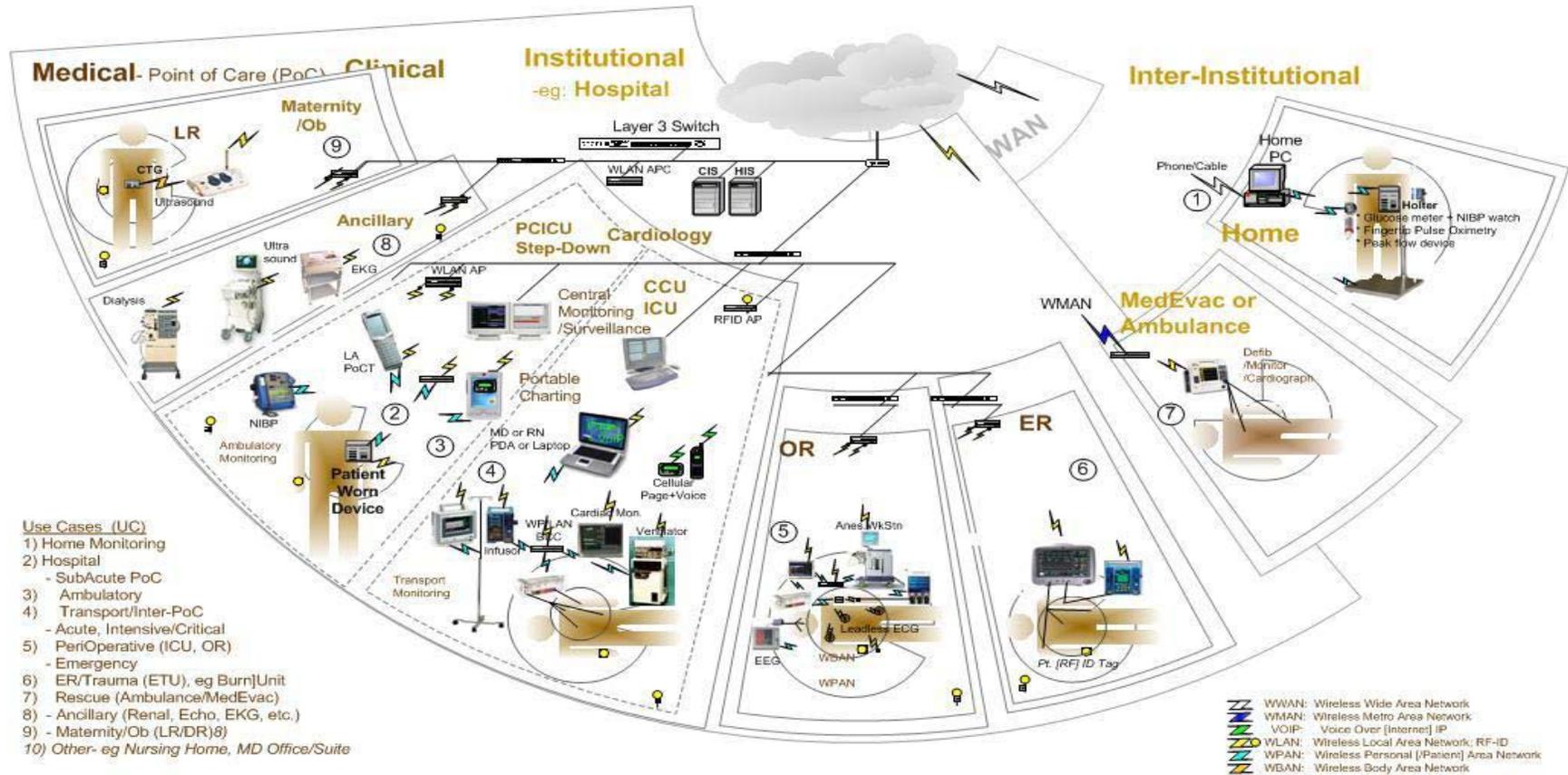


Small Cell Deployments & Healthcare

Recent developments in technology offer an increasingly wide array of products to **provide wireless coverage and capacity in limited or confined areas**. Together, they offer potentially useful solutions to addressing the **exploding demand for spectrum** that is being driven by the **exponential growth in wireless data services**.

The forum will provide an overview of small cell technologies currently available or soon to come on line, including software defined radios and enhanced Wi-Fi in both licensed and unlicensed spectrum. In addition, panelists will explore the **business opportunities** and challenges involved in **expanding wireless data coverage**. Finally, the forum will assess the potential **economic impact of small cell deployments**, particularly with respect to job creation, and explore **possible policy approaches**.

The Perfect Storm ...



Medical Grade Wireless Utility

A not for profit, hospital led initiative to ...

Create – a platform for wireless health in hospitals & senior living facilities ...
the **Medical Grade Wireless Utility (MGWU)**

Open – the **MGWU** to existing and new low-cost wireless health devices and solutions that will promote innovation

Enable – ubiquitous & democratized access to health care data in pursuit of infrastructure independence

Achieve – more assured, effective, affordable and pervasive wellness, health and acute care solutions

The Small Cell architecture can and will play a key role ...

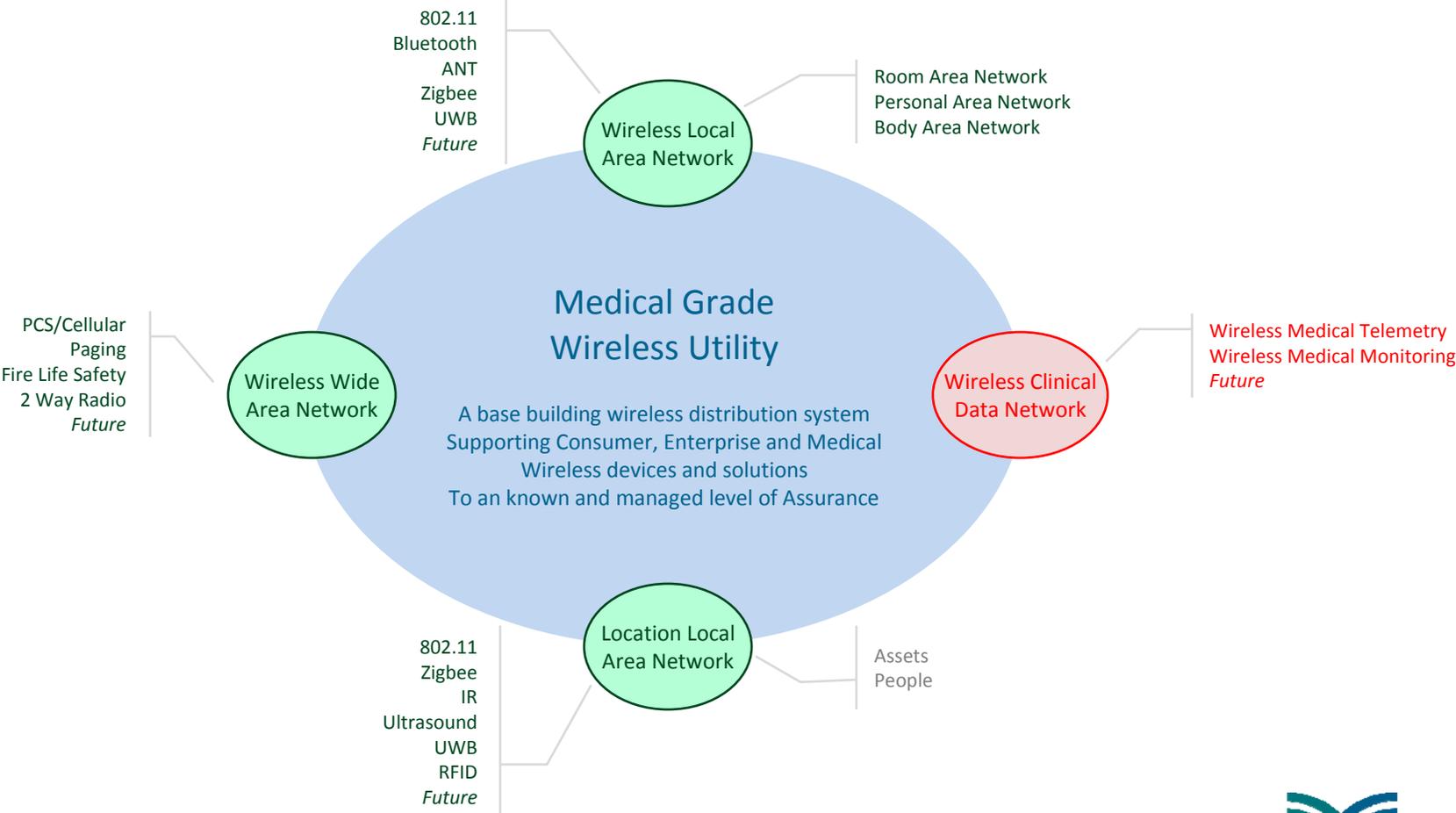
Medical Grade Wireless Utility

- Support **Consumer Grade** use of wireless
- Deliver **Enterprise Grade** wireless applications
- Create **Medical Grade** wireless for critical care

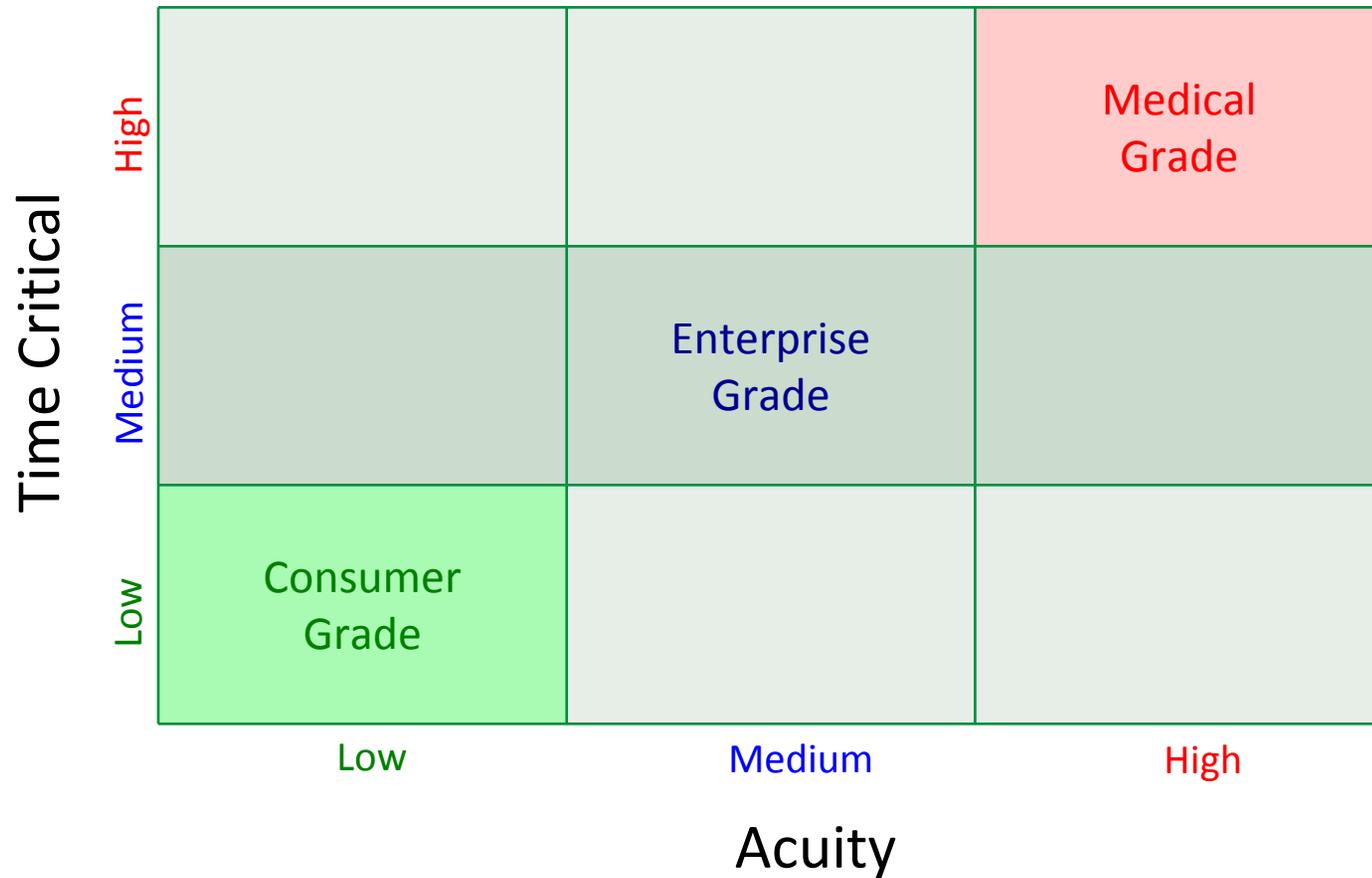
All with appropriate & defined levels of assurance

Open – Managed -- Vendor neutral

The Four Pillars of the MGWU



Assurance Drivers



Assurance

Coverage	<ul style="list-style-type: none">• % square and/or cubic feet	Certainty	Redundancy
Signal Quality	<ul style="list-style-type: none">• Signal to Noise Ratio		
Capacity	<ul style="list-style-type: none">• Simultaneous Voice and Data Users		
Security	<ul style="list-style-type: none">• Over the Air• Physical• Digital• Privacy		

Network	Consumer Grade	Enterprise Grade	Medical Grade
Coverage The % of the “area” that has wireless signal	Best Effort 85%	Engineered 95%	Guaranteed 100% Clinical Space
Signal Strength Received at device in presence of RF interference	Nominal Will Vary	Engineered Prioritized	Engineered Guaranteed
Capacity Available to the “devices” within the area	Shared	Prioritized Not Dedicated	Engineered Guaranteed Per unit area
Security Physical, Over the Air, and Digital measures to protect	Best Effort	By Policy Engineered	Comprehensive
Certainty Ability of protocol to operate in the area’s RF environment	Vary Widely	Engineered Prioritized	Very High Mission & Life Critical



Frequencies/Protocols (Example)

Network	Consumer Grade	Enterprise Grade	Medical Grade
Wireless Wide Area	700L/LTE, 800iDen, 850/GSM/HSPA/CDMA/EVDO, 900/iDen/paging, 1900/GSM/HSPA/CDMA/EVDO, 2100/CDMA/EVDO/LTE, 2600/WiMax	700L/LTE, 700U/SMR, 800SMR, 800iDen, 850/GSM/HSPA/CDMA/EVDO, 900/iDen/paging, 1900/GSM/HSPA/CDMA/EVDO, 2100/CDMA/EVDO/LTE, 2600/WiMax	<i>Future ...</i> <i>700L/LTE</i> <i>850/GSM/HSPA/CDMA/EVDO</i> <i>1900/GSM/HSPA/CDMA/EVDO,</i> <i>2100/CDMA/EVDO/LTE,</i>
Wireless Local, Room, Personal, Body Area	915/Zigbee/DECT, 2400/WiFi/Bluetooth/Zigbee/DECT, 5500/WiFi/DECT	915/Zigbee/DECT, 1920/DECT, 2400/WiFi/Bluetooth/Zigbee/DECT, 5500/WiFi/DECT	<i>401-406/Proprietary,</i> <i>608/Prop,</i> <i>915/Prop,</i> <i>1400/Prop,</i> <i>2400WiFi</i> <i>5500/WiFi</i>
Location Local Area	1575/GPS, 2400/WiFi, 5500/WiFi	433/Prop, 915/RFID/Zigbee, 2400/WiFi/Zigbee, 5500/WiFi	<i>Future</i>

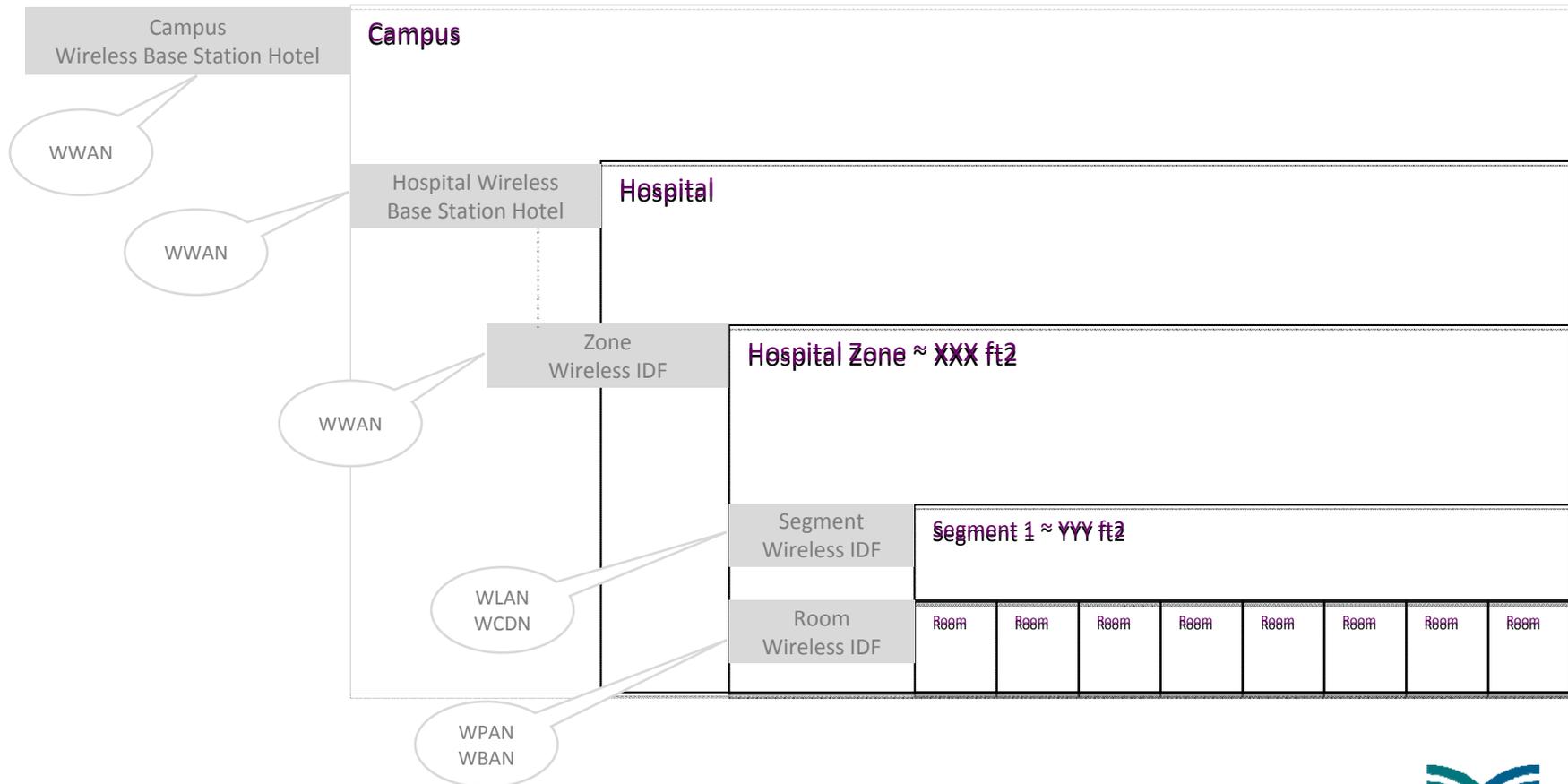
The Unit Techno-Economic of Wireless Hospital View

$$\left[\frac{\text{Capacity / MHz / Ft}^3}{\text{Cap Ex + Op Ex}} \right] \text{ Per Service Wireless Grade Assurance}$$

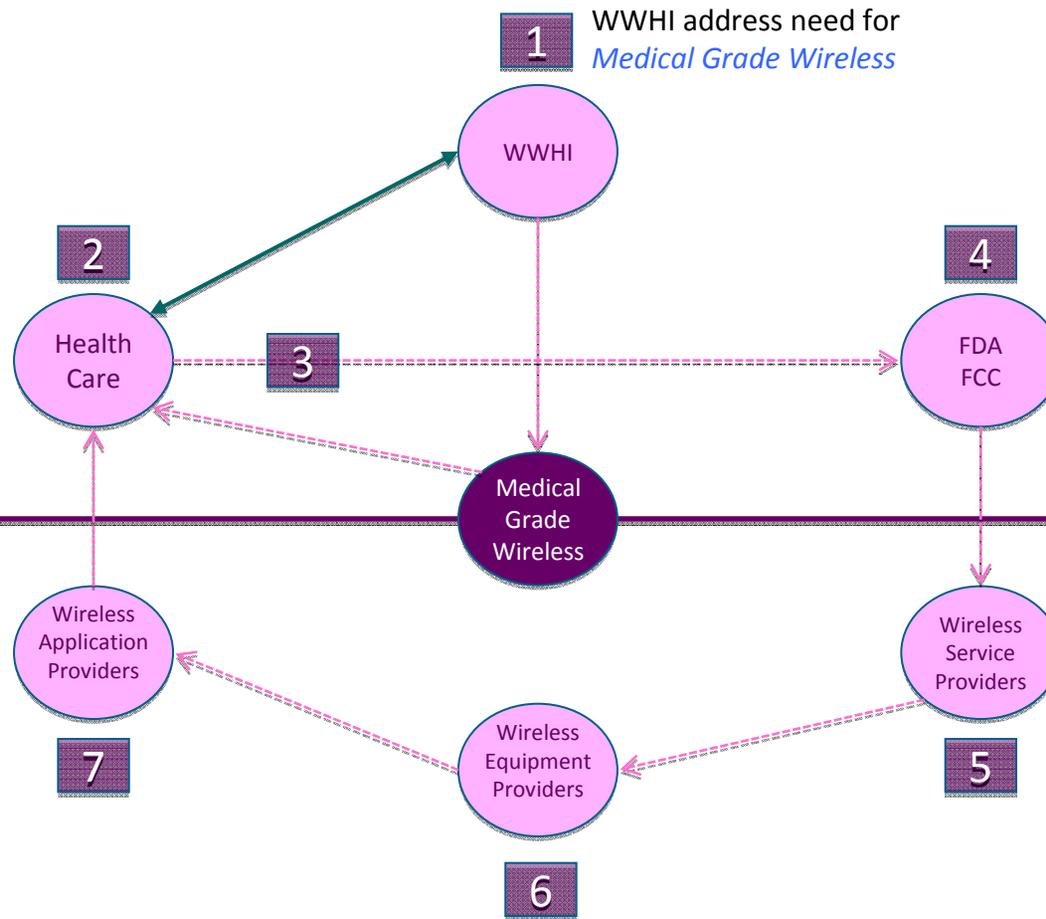
The Unit Techno-Economic of Wireless Service Provider View

$$\left[\frac{\text{Revenue / MHz / Ft}^3}{\text{Cap Ex + Op Ex}} \right] \text{ Per Service Wireless Grade Assurance}$$

Wireless Service Grades Can be Mapped to Areas



Strategy





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