Cellular Detection & Control

What you need to know…

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Introductions

Corrections Industry:
- Dr. Reggie Wilkinson – Former Commissioner of OH DOC
- John Taylor - Former CTO of VA DOC

ShawnTech Communications:
- David Gittelson – Director of New Business Development
- Dan DeCerbo – Director of IT

Proximity Wireless:
- Keith Ebel - President

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I.   **Summary of the Research** – methods and investments

II. **Terminology** – understanding the terms in the headlines

III. **Legislative & Government** – proposed   laws, laws, and petitions

IV. **Current Technology** – descriptions and pros/cons

V. **Cellular Carriers** – what they are doing

VI. **The Future** – the road ahead

I. Summary of the Research

- **Two (2) years of studying the cellular problem in prisons**
  - Correctional leaders outlined the problems & required a solution
  - Reviewed six (6) jamming companies
  - Reviewed four (4) detection companies
  - Reviewed three (3) managed access companies
  - Held numerous meetings with the cellular carriers and equipment providers.
- **Significant R&D investments**
  - Conducted RF propagation study/site survey
  - Legal (written testimony and petitions)
  - FCC – Temporary License (STA)
- **Partnerships**
  - Proximity Wireless - in building coverage expert
  - Various equipment manufacturers
  - Cellular carriers

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II. Terminology

II. Terminology

Detection – Detection is the process of locating, tracking, and identifying various sources of radio transmissions. Detection, or direction finding, is used in a wide variety of applications including, for example, cell phone assignments, the location of 911 emergency calls and marine distress calls.

Jamming – Radio jamming is the deliberate radiation, re-radiation, or reflection of electromagnetic energy for the purpose of disrupting use of electronic devices, equipment, or systems

Managed Access – intercept calls in order to allow corrections officials to prevent inmates from accessing carrier networks. The cell signal is not blocked by a jamming signal, but rather, is captured (or rerouted) and prevented from reaching the intended base station, thereby disallowing the completion of the call. Includes an Authorized Allowed, Un-Authorized and Gray list.

Source: National Telecommunications and Information Administration (NTIA) Notice of Inquiry, Preventing Contraband Cell Phone Use in Prisons

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III. Legislative & Government

Federal

▪ **Safe Prisons Communications Act of 2009** – seeks to amend The Communications Act of 1934 to allow Jamming for correctional facilities.
- ShawnTech Written Testimony to include "other technology"
- ACA / ASCA modified by laws to include "other technology"
- Approved by Senate S.251 - http://www.govtrack.us/congress/bill.xpd?bill=s111-251
- Pending House Vote HR.560 - http://www.govtrack.us/congress/bill.xpd?bill=h111-560

▪ **The Cell Phone Contraband Act of 2010** – seeks to amend the federal criminal code to prohibit the possession or use of cell phones and similar wireless devices by a Federal Prisoner.
- Passed Senate April – Referred to the House Committee on the Judiciary http://www.govtrack.us/congress/bill.xpd?bill=s111-1749

III. Legislative & Government

States

▪ **California SB 434 - Correctional facilities: wireless communication devices**. – Proposes that anyone in possession of, or delivering (including attempted delivery) any cellular telephone or other wireless communication device to a person in the custody of a correctional institution, is *guilty of a felony*.
http://info.sen.ca.gov/pub/09-10/bill/sen/sb_0401-0450/sb_434_bill_20090226_introduced.html

▪ **Texas HB 3228** – Makes it a felony for a person in the custody of a correctional facility to possess a cell phone.
http://www.legis.state.tx.us/billlookup/Text.aspx?LegSess=81R&Bill=HB3228#

III. Legislative & Government

FCC Petitions

- **District of Columbia** – requested to conduct jamming tests

- **CTIA** – not in favor of jamming tests

- **South Carolina DOC** – requested jamming authorization from the FCC

- **Mississippi DOC** – requested that "managed access" systems be allowed by the FCC

- **National Telecommunication & Information Administration (NTIA)** – requested testing of Jamming equipment at a "government agency" – Approved, results pending

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IV. Current Technology

Pros and Cons of Current Cellular Interdiction Techniques and Technologies

Based on Vendor Interviews, Vendor Demonstrations, and Test Implementations conducted in Maryland

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The Problem

- **Inmate cell phone use:**
  - Poses security risks at the institutions
  - Permits organized crime and gang leaders to operate their organizations from prison
  - Poses security risks to the public
  - Reduces revenue and removes audio surveillance of State contracted phone systems

How bad is the problem

- **California Corrections :**
  - 2006 - 261 cell phones confiscated
  - 2008 - 2,811 cell phones confiscated
- **Maryland Corrections:**
  - 2008 - 1,200 cell phones confiscated
  - 2009 – 1,700 cell phones confiscated

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Systems & Methods in Use and /or Tested

- Perimeter Security
  - Inmate Re-entry after Work Release, Outside Details, or Transfer
  - Staff, Visitor, and Package Entry
  - Perimeter Checks
- Detection Measures
  - Cell Phone Sniffing K-9
  - Handheld Detection Devices
  - Portable Detection Systems
  - Fixed Detection Systems
- Cellular Jamming
- Managed Access

Perimeter Security

Security

Perimeter Security
- Inmate Re-entry after Work Release, Outside Details, or Transfer

Strip searches and Body Orifice Security Scanners (BOSS Chair) which can detect cell phones and other metallic objects hidden in or on a person.

Perimeter Security
- Staff, Visitor, and Package Entry

- Metal Detectors
- X-ray Machines
- Frisk Searches
- Denial of Entry

Security

Perimeter Security

- Perimeter Checks

Cell phones and cell bundles
thrown over perimeter fences

Security

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Detection

Detection

Detection Measures
- Cell Phone Sniffing K-9

Pros	Cons
Non Technical	Dog's stamina level limits the number of searches that can be performed consecutively.
Low cost. Officer's salary and 4-5 weeks training. Can be $4000 a dog, but free for MD due to our breeding program.	Time Consuming
Dogs only alert to cell phone battery odor	Labor intensive
Device does not have to be on	
Legal to use today	

Detection

Maryland DOC:
Three dogs working part time are finding approximately 100 phones a year.

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Detection Measures

- Handheld RF Detection Devices

Pros	Cons
Mobile	Device has to be on
Low upfront costs (< $5k a device)	Limited to no intelligence gathering capability
Detects all technologies available today	Phones are still functional
Shows approx location of devices	Labor intensive
Legal to use today	Limited upgrades
	Easy to spot (prevented by shutting the phone off)
	Limited Range
	Environmental RF interference (false positives)

Detection

Detection Measures

- Portable RF Detection Systems

Pros	Cons
Mobile, can be moved from tier to tier	Power needed to recharge batteries
Medium upfront costs (< $50k a system)	Systems wireless communications are poor in correctional facility
No wiring costs	Have to secure devices from inmate sabotage
Detects all technologies available today	Device has to be on
Shows approx location of devices	Limited to no intelligence gathering capability
Legal to use today	Phones are still functional
	Labor intensive

Detection

Detection Measures

- Fixed RF Detection Systems

Pros	Cons
< $100k for smaller facilities	Device has to be on
Detects all technologies available today	Limited intelligence gathering capability
All cell phone usage is detected and reported all the time	Phones are still functional
Sensors can be PoE	Have to provide wiring and/or power to support detection network
Shows approx location of devices	Have to secure devices from inmate sabotage
Legal to use today	Difficult and costly to adapt to changes in the radio environment
Upgradeable (software/firmware/hardware)	

Detection

Cellular Jamming

Jamming

Cellular Jamming

Pros	Cons
Can stop all calls on cellular devices	Illegal (outside of Federal jurisdictions)
Can stop all technologies available	Indiscriminately jams the frequency
	Difficult to prevent jamming outside the facilities perimeter; especially difficult in metro areas
	911/e911 and First Responder interference
	Costly for Carriers to support
	Difficult and costly to adapt to changes in the radio environment
	Interference with the public
	Depending on the type of deployment, text and SMS messages may still go through

Jamming

Cellular Jamming

The operation of transmitters designed to jam or block wireless communications is a violation of the Communications Act of 1934, as amended ("Act"). See 47 U.S.C. Sections 301, 302a, 333. The Act prohibits any person from willfully or maliciously interfering with the radio communications of any station licensed or authorized under the Act or operated by the U.S. government. 47 U.S.C. Section 333. The manufacture, importation, sale or offer for sale, including advertising, of devices designed to block or jam wireless transmissions is prohibited. 47 U.S.C. Section 302a(b). Parties in violation of these provisions may be subject to the penalties set out in 47 U.S.C. Sections 501-510. Fines for a first offense can range as high as $11,000 for each violation or imprisonment for up to one year, and the device used may also be seized and forfeited to the U.S. government.

Jamming

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Managed Access

Managed Access

Managed Access

Pros	Cons
Can allow and disallow calls, text/SMS messages, data connections, etc.	Fairly expensive today (> $200k per site)
Allows know "state issued" phones to be used	Extensive RF survey and propagation study needed to ensure all phones within the facility perimeter are managed
Intelligence gathering capability (number dialed, text messages)	Difficult to keep devices outside the facility perimeter from being managed
Shows approx location of devices	Limited testing has been conducted
Can allow 911/e911 or reroute as needed	Limited iDEN, 3G, and 4G availability
Upgradeable (software/firmware/hardware)	Device has to be on
Can exclude prison communication radios/systems	
Legal today with cell phone carrier approval or FCC STA	

Managed Access

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Managed Access Solution

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What are the Keys to Long-term Achievable Objectives?

- All existing and future bands and services must be controlled.
- Corrections solutions should blend seamlessly with wireless service provider networks, and not cause any disruptions to service providers or their networks.
- Leverage the technology that is already in place.

Benefits of Managed Access

- Managed Access Works in Rural, Suburban, Urban, and Dense-Urban Environments
- Can use existing cellular "macro" or add DAS to supplement coverage and/or support internal services.
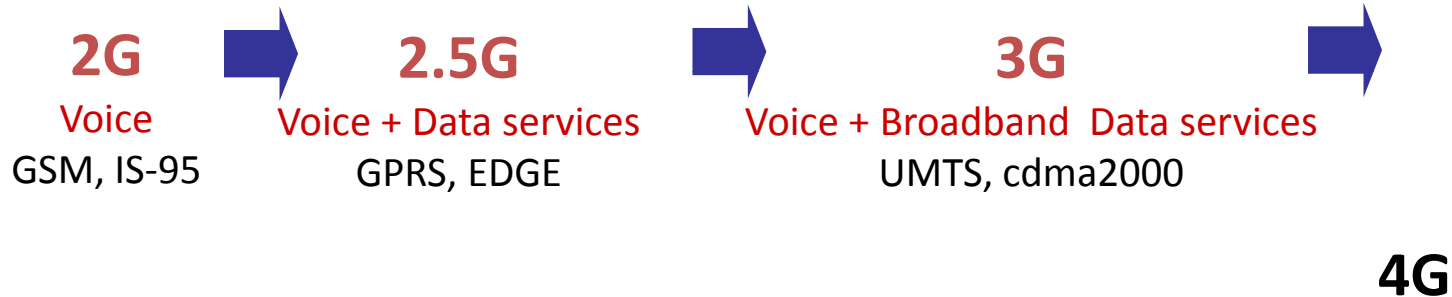- Scalable and Expandable.
- Future proof.

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Current Bands & Technologies

Carrier	Public Bands	Technology
AT&T	850MHz, 1900MHz, 2100MHz, 700MHz (future)	GSM/GPRS, EDGE, UMTS/HSPA, LTE Planned
T-Mobile	1900MHz, 2100MHz	GSM/GPRS, EDGE, UMTS, LTE Planned
Verizon	850MHz, 1900MHz, 2100MHz, 700MHz (future)	CDMA, CDMA2000 1xEvDO
Sprint / Nextel Clearwire	800MHz, 900MHz, 1900MHz, 2500MHz	iDEN, CDMA, CDMA2000 1xEvDO, WiMAX
Cricket	1900MHz, 2100MHz	CDMA, CDMA 1xEvDO

Technologies Continue to Evolve

Cellular

2G → **2.5G** → **3G** →

Voice | Voice + Data services | Voice + Broadband Data services
GSM, IS-95 | GPRS, EDGE | UMTS, cdma2000

4G

Wireless LANS

802.11b → **802.11a/Hiperlan II** → **QoS** →

Up to 11 Mbps | Up to 54 Mbps | Multi-services
2.4 GHz Band | 5 GHz Band

How does a corrections facility stay ahead of the changes without wireless industry leadership and support?
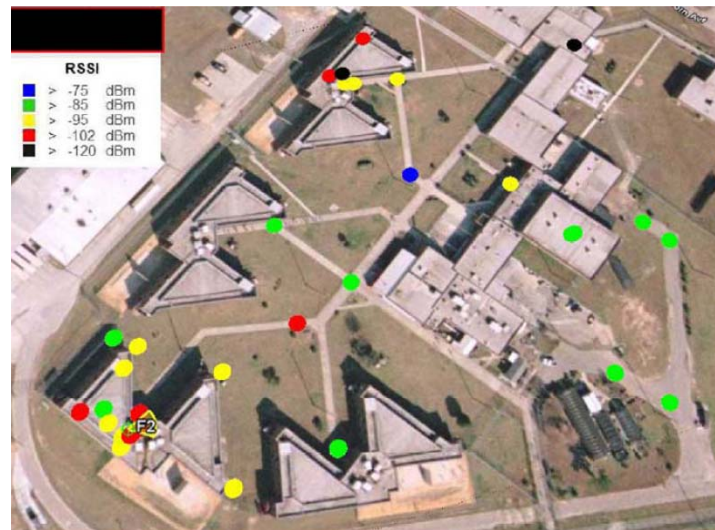
Cellular Coverage: Impossible to Eliminate via the "MACRO"

Propagation Factors
- Steel
- Concrete
- Coated glass
- Ductwork
- Partitions
- Elevators
- Stairwell
- Floor to floor
- Courtyards
- Dense / Open

Carrier Coverage
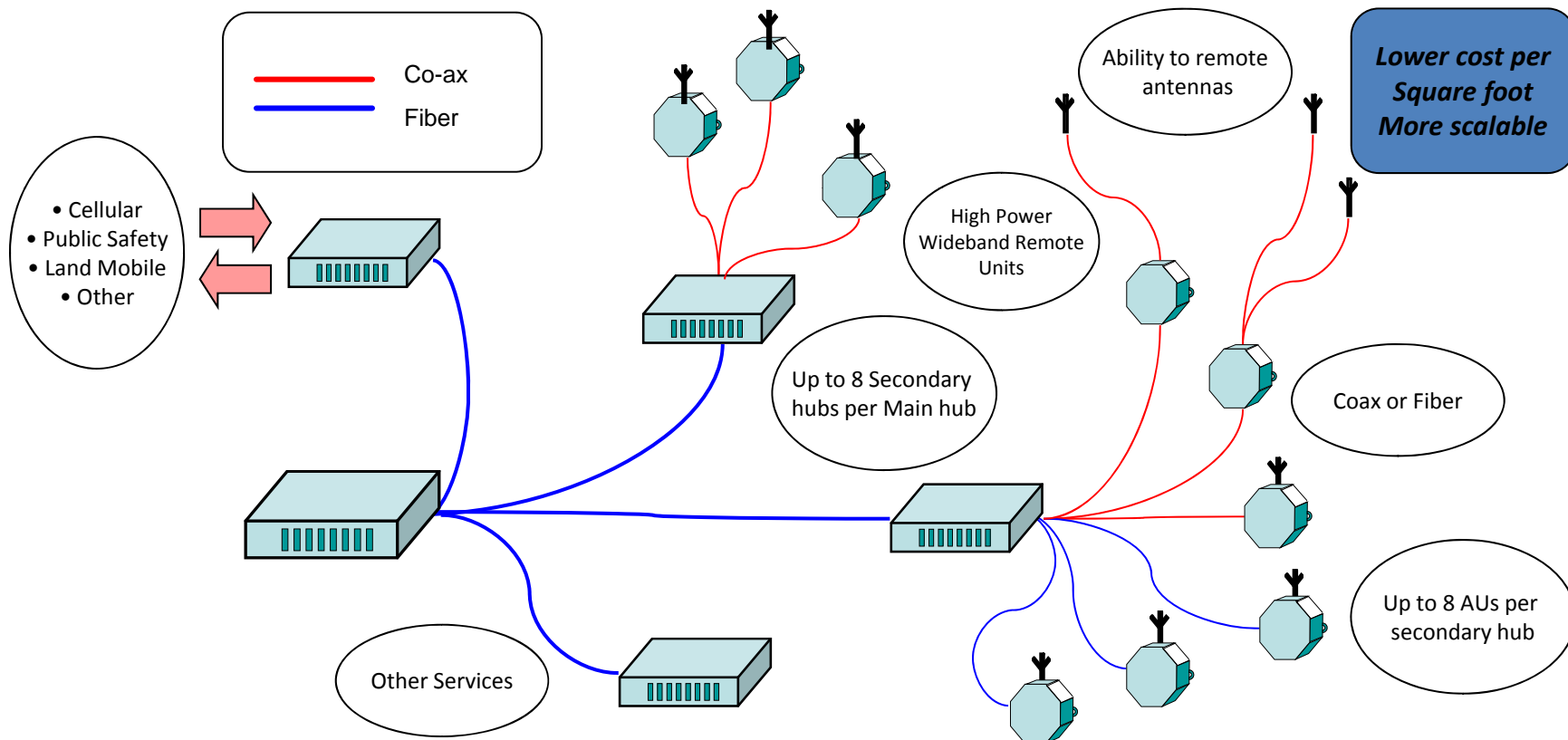- Verizon
- Alltel
- AT&T
- Sprint
- T-Mobile
- Cricket

RSSI
>	-75	dBm
>	-85	dBm
>	-95	dBm
>	-102	dBm
>	-120	dBm

DAS (Distributed Antenna System)

- Many facilities will need supplemental coverage via DAS to support desired services.

- Corrections will team with niche providers for engineering, survey, design, deployment, and management of such systems.

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Wideband DAS (Distributed Antenna System)

Co-ax

Fiber

- Cellular
- Public Safety
- Land Mobile
- Other

Ability to remote antennas

Lower cost per Square foot More scalable

High Power Wideband Remote Units

Up to 8 Secondary hubs per Main hub

Coax or Fiber

Up to 8 AUs per secondary hub

Other Services

DAS infrastructure that services R.F. bands from 136-2700MHz not only allows control over "Managed Access" wireless services but, is also available to support other desired or required correctional wireless services. DAS is a natural extension of the cellular macro.

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![Corrections Technology Association — A Forum for Collaboration](logo)
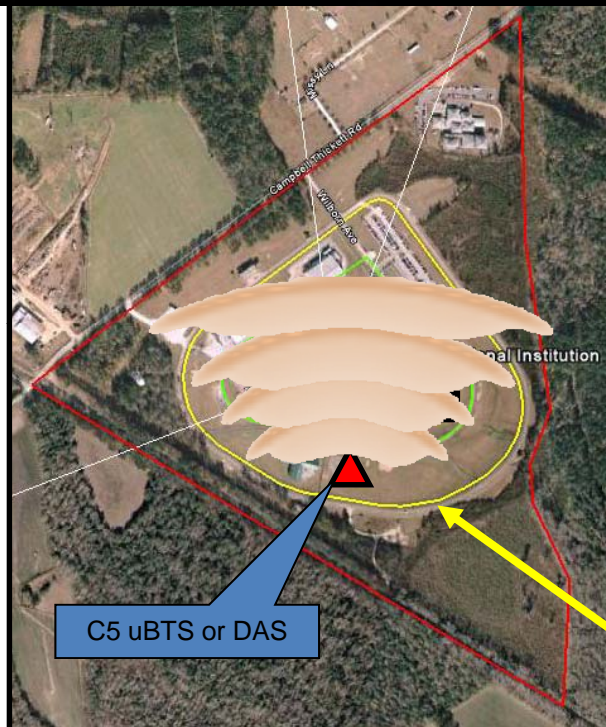
Part of the Global Wireless Infrastructure
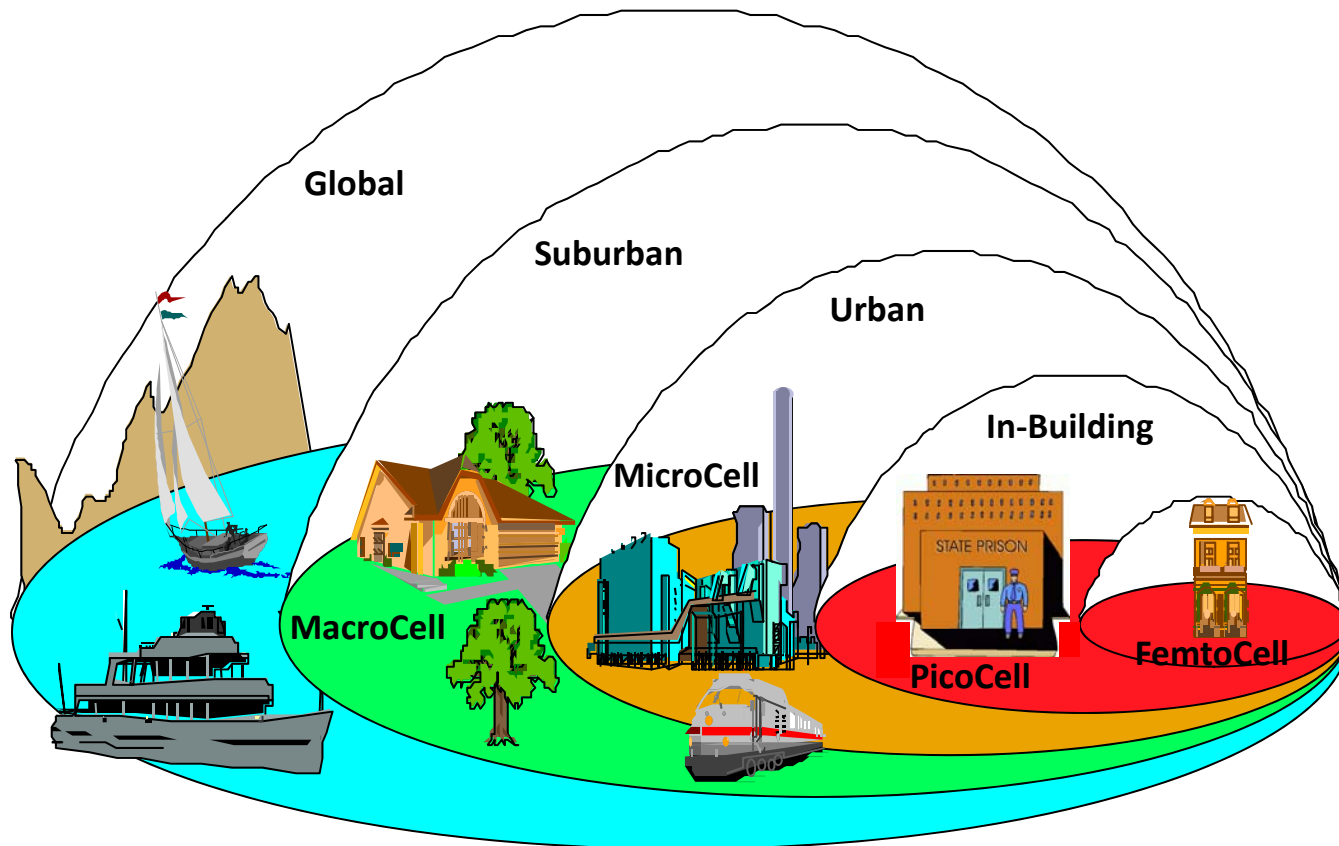
Use of contraband cell phones inside prisons is a huge problem, but controlling the problem does not fall outside existing network infrastructure capabilities.

Public Safety / First Responders Technologies

Entity	Bands	Technology
Public Safety	150-174 MHz	Private LMR
First Responders	220-222 MHz	(Land Mobile Radio)
	450-470 MHz	Fixed / Base / Mobile
CFR47	470-512 MHz	
Chapter 1	769-775 MHz	x960 6.25KHz Digital Channels
Part 90	799-805 MHz	
	806-817 MHz	763-768 MHz Goes Broadband in 2007
	851-862 MHz	793-798 MHz Goes Broadband in 2007
	928-930 MHz	
	1427-1432 MHz	6.25KHz, 12.5KHz, 25KHz
	2450-2500 MHz	Digital and Analog

Many state, county and local jurisdictions are looking for First Responder coverage solutions into many types of correctional facilities due to the R.F. dense buildings in which such facilities are housed. This is true at 450MHz and above and especially important for 700/800/900MHz public safety wireless systems. C5 can supply supplemental coverage for these services.

C5 uBTS or DAS

Controlling the Perimeter

Perimeter control is assisted thru use of cellular Location-Based Services (LBS). Urban sites will require much better accuracy vs. rural / remote sites. Rural sites can use an added DAS / uBTS to support better signal & Location Services.

Carrier Base Stations

Perimeter	Average Radius	Radius Increase
Inner	176m	0m
Outer	264m	88m
Property	469m	205m

LBS uses time & angle of arrival, not signal strength.
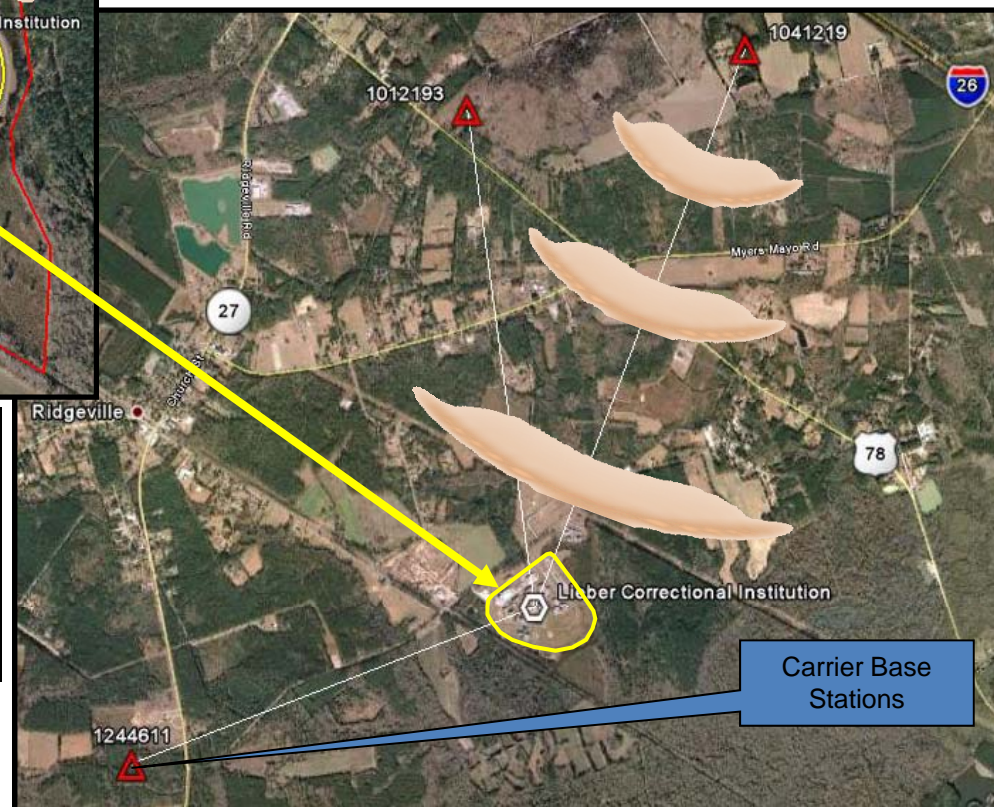
User Determination

• White listed/authorized are defined by the correctional authorities

• Black listed/unauthorized are identified via intelligence gathering

• Gray List users are undetermined and will be added to white or black list pending review/investigation.

Symbol	List Tag	Status
U1 ✓	White List	Approved
U2 ×	Black List	Blocked
U3 ?	Grey List	TBD

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Urban Facilities & C5 Use of LBS (Location Based Services)

With proper infrastructure LBS can locate "gray list" user within 100 foot radius.

Must actively co-exist in the cellular macro while blocking unauthorized calls and passing calls from users outside the prison. Equipment must be able to locate "gray list" phones within the prison boundaries.

Keys to Wireless Success

- Always needs careful RF planning!
- Must not interfere with Network
- Flexible Infrastructure
- Multiple Services
- Expandable
- Scalable
- Carrier Friendly

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V. Cellular Industry

V. Cellular Industry

- **CTIA**
  - - Against Jamming
  - - Supports "other" technology

- **Carriers**
  - - Need to support the "solution" as they own the spectrum
  - - Long term sublease agreement needed
  - - ROI – sustainable model

- **Vendors / Equipment Manufacturers**
  - - Managed access limited testing
  - - Jamming undergoing Federal testing
  - - Detection various Federal and State agencies

VI. The Future

- **Government**
  - NTIA notice of inquiry (NOI)
  - FCC to move issue to public safety (APCO)

- **Manufacturers**
  - Prove equipment will meet industry requirements
  - Release 3G, 4G and beyond protocols

- **Correctional Industry**
  - Long term testing needed (Leiber CI/STA)
  - Wireless infrastructure/convergence
  - Correctional Cellular Communication Call Control (C5) the next generation of inmate communications

Contact us for more information

C5@shawntech.com

1-800-722-9580

CTA Booth #1.

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Questions and Answers?

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Proximity WIRELESS
"BRIDGING the WIRELESS gap"