

LAND MOBILE RADIO SYSTEM NARROWBANDING (IMPACT ON TRANSIT "ITS")

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Questions to be *Discussed*...

- Why is this important to you?
- Am I affected? (We still use radios?!)
- What's the difference between "Rebanding" and "Narrowbanding"?
 - ...or, more importantly, who pays?
- Is anything else affected?

Why should the Transit CIO Care?

- Radio systems (still) play a critical communications resource for many/most public transit operations (all modes)
 - Voice dispatch
 - Conduit for ITS functions
- Radio systems are increasingly within IT's area of responsibility
- Complying with federal law might be far more costly, disruptive, and time-consuming than you thought

Recent FCC actions on LMR Spectrum

- 800 MHz “Rebanding” (mid. 2000)
 - Purpose: alleviate interference on public safety channels by Nextel (Sprint)
 - Sprint paid for (most) cost impacts incurred by public safety **and transit** licensees
 - All but last phase (IV) complete; awaiting border frequency coordination treaties between USA/Mexico and USA/Canada

Most transit agencies have not incurred any significant cost by 800 MHz rebanding

Recent FCC actions on LMR Spectrum (cont.)

- 700 MHz Spectrum Allocation (mid. 2000)
 - Open new spectrum resulting from moving TV broadcasters from analog to DTV standard
- VHF/UHF “Narrowbanding” (1991)
 - Double (or quadruple) overall spectrum utilization efficiency through deployment of more modern radio technologies

Recent FCC actions on LMR Spectrum (cont.)

- 25 MHz “wideband” channels must be relicensed to 12.5 MHz “narrowband” operation by January 2013, **and/or...**
- Achieve an “efficiency standard” of 9.6kbps per 12.5 MHz channel for data applications
 - Impact on older CAD/AVL systems?
- Quarter (6.25) channel is FCC’s ultimate goal, but deadline is TBD

What is this "Spectrum" and Where does "Narrowbanding" fit?

UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

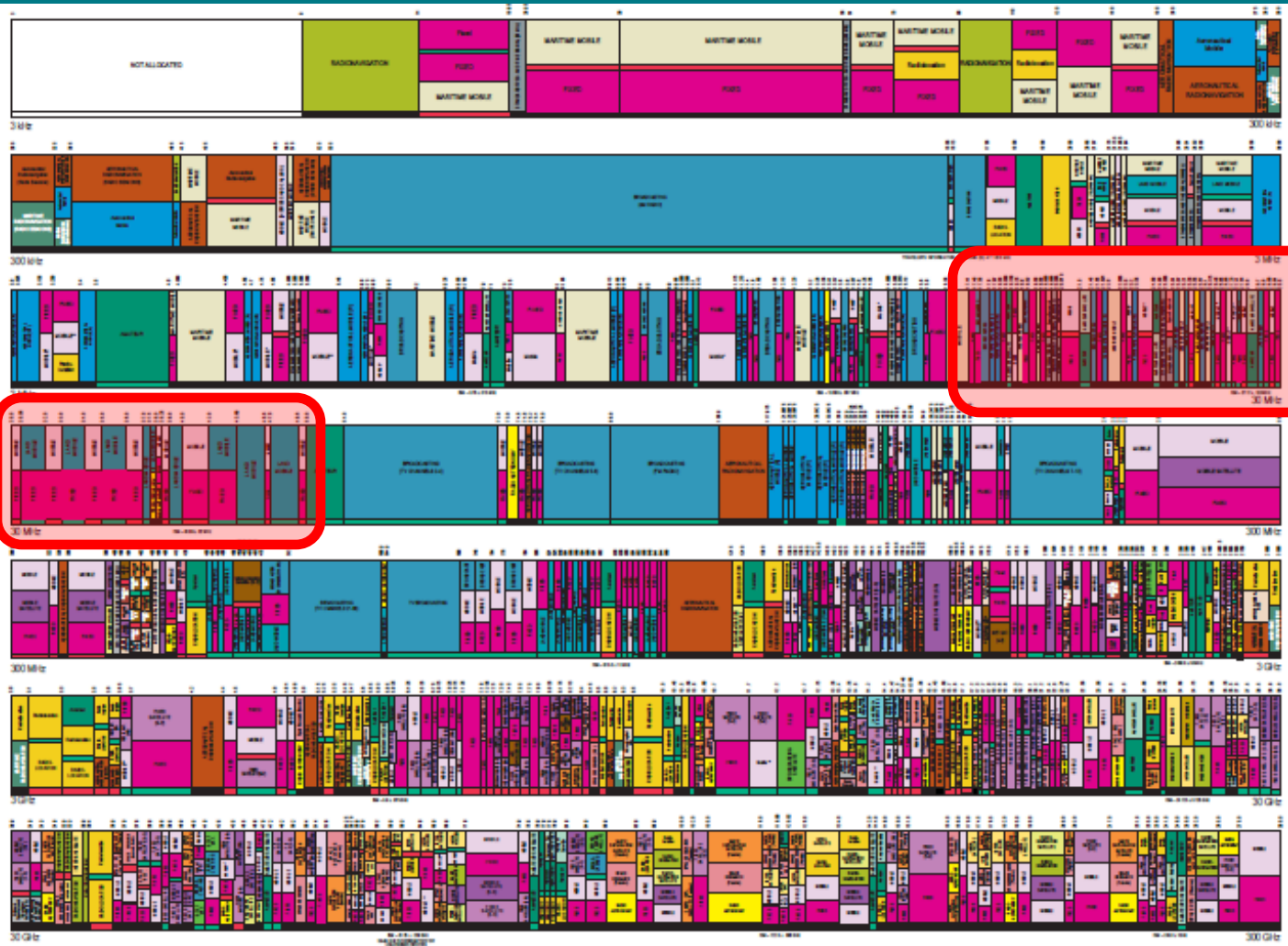
AIRMOBILE MOBILE	AIRMOBILE	MOBILE
AIRMOBILE MOBILE SATELLITE	AIRMOBILE SATELLITE	MOBILE SATELLITE
AIRMOBILE NAVIGATION	AIRMOBILE SATELLITE	NAVIGATION
WATER	WATERMOBILE	NAVIGATION SATELLITE
WATER SATELLITE	WATERMOBILE SATELLITE	NAVIGATION SATELLITE
WIRELESS	WIRELESS NAVIGATION	NAVIGATION SATELLITE
WIRELESS SATELLITE	WIRELESS SATELLITE	NAVIGATION SATELLITE
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FID SATELLITE	WIRELESS SATELLITE	NAVIGATION SATELLITE

ACTIVITY CODE

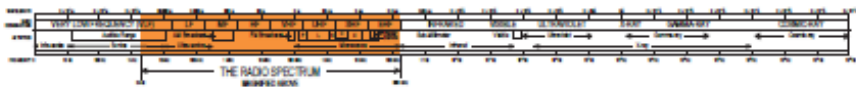
COMMERCIAL	COMMERCIAL-COMMERCIAL
NON-COMMERCIAL	

ALLOCATION USAGE DESIGNATION

Primary	Secondary	Capital Letter	Other

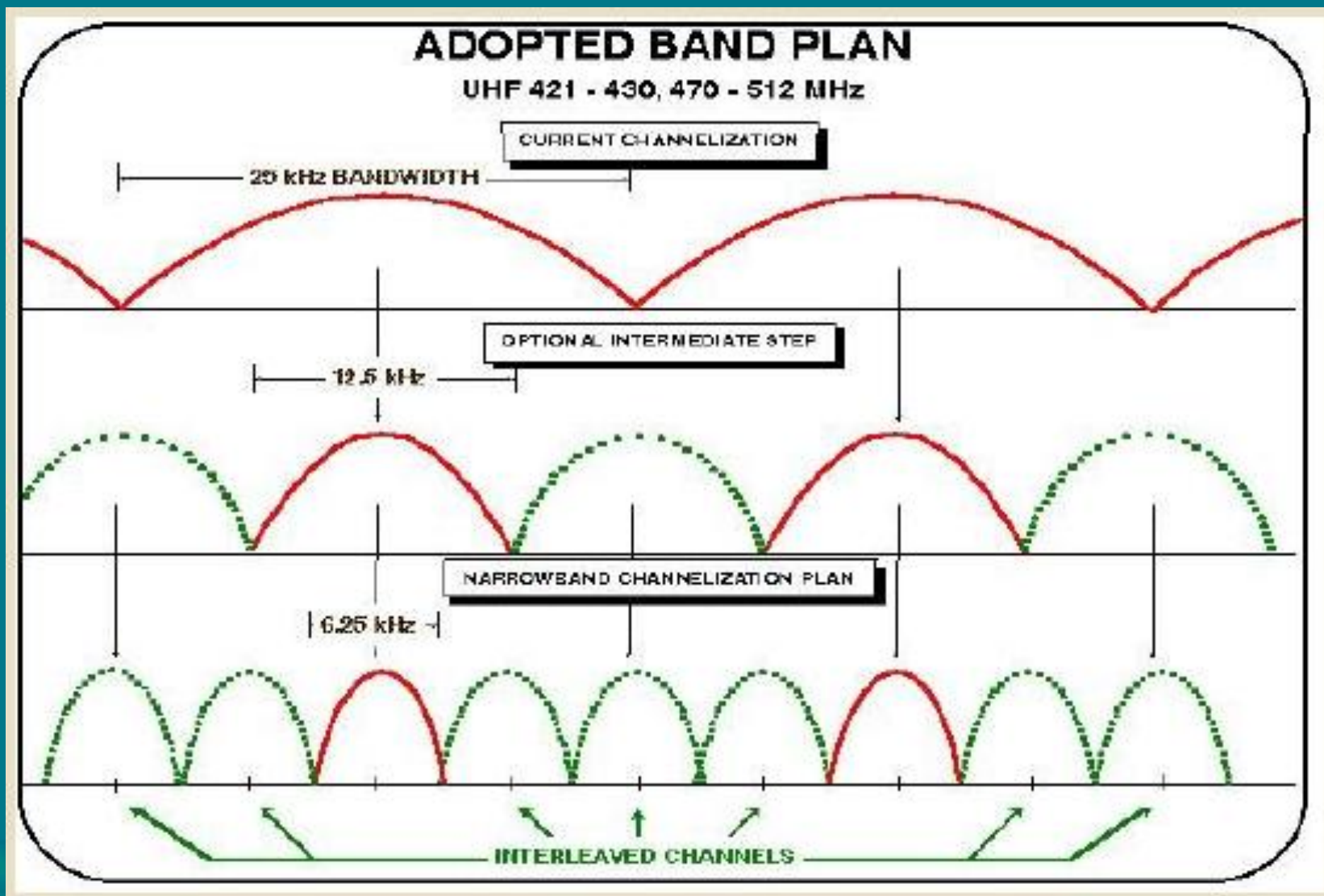


The chart is a summary of the information contained in the Federal Communications Commission's (FCC) Radio Frequency Allocation Table (RFAT) and is not intended to be used as a legal reference. For more information, please visit the FCC's website at www.fcc.gov.



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What's Narrowbanding Look Like (UHF)?



A Little History – Transit Fleet Communications and ITS



- In the beginning...
- Conventional LMR
 - Most appropriate (at the time)
 - Mostly UHF
 - Open channel
 - No access control
 - Voice only

A Little History – Transit Fleet Communications and ITS (con't)

- Solution?
 - Metrocomm™
 - Introduced by Motorola ~1960s
 - First “RTT” oriented product
 - Dedicated “data” channel
 - Dispatcher-controlled access
 - Obsolete (phased out ~mid. 1980s)
 - ***Still in use by some transit agencies today!***

A Little History – Transit Fleet Communications and ITS (con't)

- Metrocomm Replacement?
- Computer Aided Dispatch
 - Early 90's
 - Leverage emerging computer technologies
 - Originally designed around conventional LMR with dedicated data channel
 - Replicated *and expanded* Metrocomm's functionality...

The screenshot displays the Fleet.mxd CAD software interface. It features a menu bar (File, Control, Data, Admin, View, Window, Help) and a toolbar. The main window is divided into two panes. The left pane, titled 'Incident Status', contains a table with columns for Type, Time, VID, Route/Block, Oper, Status, Priority, and Message. The right pane, titled 'Work Assignment Status', contains a table with columns for Route/Block, Status, Dev, VID, Oper, Dir, Last TP, and Time. Below the tables are several status fields for 'Desc', 'Vehicle Id', 'Operator', 'Route', 'Block', 'Last TP', 'Time', 'Int', 'Call Status', 'Vehicle Status', 'Dev', 'Date/Time', 'Next TP', and 'Call Status'. The status fields show values such as 'Priority: Req To Talk', 'Date/Time: 8/6/98 16:46:12', 'Controller Id: 1111', 'Vehicle Id: 0021', 'Operator: JARNEY, J', 'Route: 0', 'Block: 0', 'Last TP: ', 'Time: 00:00', 'Int: ', 'Call Status: NO CALL', 'Vehicle Status: LOGOFF', 'Dev: 0', 'Date/Time: 8/7/98 13:51', 'Vehicle Id: 0052', 'Operator: JARNEY, J', 'Route: 24', 'Block: 1', 'Last TP: Hen-Holly', 'Next TP: MSM', 'Call Status: NO CALL', and 'Dir: IN'.



A Little History – Transit Fleet Communications and ITS (con't)

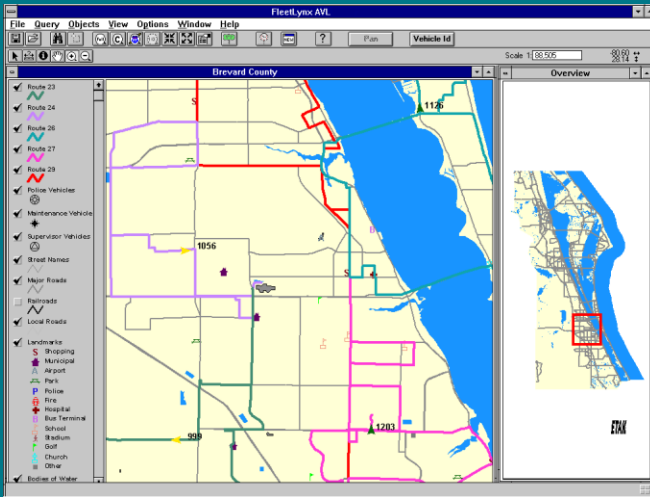
- Metrocomm

- Access Control via...
 - Request-to-Talk (RTT)
 - “Priority” RTT
- Emergency/Silent Alarm
- Fleet-wide calls

- CAD

- Access Control via...
 - Request-to-Talk (RTT)
 - “Priority” RTT
- Emergency/Silent Alarm
- Fleet-wide calls
- *Group calls*
- *Text messaging*
- *Online Records Mgt*
- *Incident Reports*
- *...and, with GPS, opened the door to...*

A Little History – Transit Fleet Communications and ITS (con't)



- Automatic Vehicle Location
 - *Near* real-time
 - 1-5 min "polling"
 - Route/Schedule adherence
 - QoS reports
 - Headway management
 - Transfer protection
 - Paratransit pick-up/drop-off



So, Why Has Transit Stuck with LMR Thus Far?

- Legacy capital investment
- Familiar technology
- Pre-existing support structure
- FTA capital grant rules
- Predictable coverage
- Long life cycle
- *Early* ITS was designed around it

But Transit's Technology Vision Has Recently Evolved...



- Web presence
- Accurate real-time service information (e.g. bus arrival)
- Interoperable Communications
- New Payment Technologies
- On-board Wi-Fi
- Live, in-vehicle, CCTV
- Automated Incident Mgt
- TODSS

So, Can Today's LMR Systems Support This New Transit Vision?



- Interoperability?
 - Absolutely!
- ITS functions that require *high speed* wireless data?
 - No, or...
 - Not very well

One way to achieve “interoperability”

Does Transit Have Other Technologies Available?

	Advantages	Drawbacks
Public Cellular (2G/3G)	<ul style="list-style-type: none"> • High speed (40 - 600 kbps) • Proven, stable access • Affordable deployment • Wide coverage • Push-to-Talk functionality 	<ul style="list-style-type: none"> • Shared access • Unpredictable coverage • Unpredictable access • Recurring fees
Public Broadband (4G)	<ul style="list-style-type: none"> • Emerging technology (WiMax vs. LTE?) • Broadband (2 - 20Mbps) 	<ul style="list-style-type: none"> • Slow rollout/coverage • Data-centric • <i>Premium</i> recurring fees
Private Wi-Fi ("MESH")	<ul style="list-style-type: none"> • Standard networking • Easily expandable and reconfigurable • Low LCC 	<ul style="list-style-type: none"> • Costly rollout • Can be prone to interference (wireless phones)
IP Radio	<ul style="list-style-type: none"> • Common Voice & Data • Mission critical performance • Interoperable 	<ul style="list-style-type: none"> • Expensive • Low-speed data

Narrowbanding?...Decision Time Is Now!

What Do I Have?

But when it comes to your legacy UHF or VHF radio system...

What Must I Do?

Available Solutions?

What Can I Afford?

When Must I Decide?

What Do I Need?

*Applies to any decision-making:
Cars...Houses...Dating
...Divorcing...*

What Are Transit's Options?

- Narrowband current radio system
 - Relicense current UHF/VHF channels
 - *Possibly* replace mobile and portable radios, repeaters...
- Legacy CAD/AVL?
 - Possibly replace or redesign data channel modems and interfaces
 - Or, possibly...*replace the entire ITS system*

What Are Transit's Options? (con't)

- Migrate to a "shared" system
 - Surrender current VHF/UHF channels
 - *Possibly* replace mobile and portable radios, repeaters...
- Legacy CAD/AVL?
 - Add new data channels for transit
 - Possibly replace or redesign data channel modems and interfaces
 - Or...replace the entire ITS system

What Are Transit's Options? (con't)

- 100% public cellular (2G/3G/4G)
 - Surrender current VHF/UHF channels
 - Dismantle radio system
 - Legacy CAD/AVL?
 - Replace or redesign data channel modems and interfaces
 - Or, *more likely*...replace the entire ITS system

What Are Transit's Options? (con't)

- “Hybrid” system
 - Unhinge CAD/AVL voice and data functionality
 - Voice remains on radio system
 - Move data to cellular

Summary/Take-Aways

- It's only *20 months* until the January 2013 UHF/VHF Narrowbanding deadline
 - APCO stat (Dec. 2010): only ~25% of UHF licenses fully narrowbanded
- Narrowbanding *will likely* affect your legacy CAD/AVL radio system
- It could be (very) costly, time-consuming, and demanding on already meager, overworked, staff

Summary/Takeaways (cont.)

- Consider other wireless communication system options depending on...
 - Where your transit agency is today
 - Your service and technology visions for the future
 - What you can afford
- **In all cases, if your agency operates an old VHF/UHF radio system, you likely *will* have to do something about it...and soon!**

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