



November 11, 2013

By Electronic Filing

Ms. Marlene H. Dortch
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: PS Docket No. 13-209
PS Docket No. 12-94
PS Docket No. 06-229
Notice of Ex Parte Presentation

Dear Ms. Dortch:

On November 7, PowerTrunk, Inc. participated in the Americas Spectrum Management Conference in Washington, DC. During the conference, the undersigned served on a panel and discussed TETRA and PowerTrunk's TI DLNR technology and summarized recent FCC proceedings relating to TETRA. The undersigned also discussed the extensive use of TETRA worldwide and described how TETRA is more spectrally efficient than broadband technologies. With respect to primary responders, I advocated that a hybrid LMR-Broadband solution, rather than replacing LMR technology with broadband technology, is more beneficial. In addition, the attached presentation was made available to all attendees through an Internet link. The undersigned understands that FCC personnel were in attendance for the referenced conference panel.

In accordance with the Commission's Rules, a copy of this filing is submitted for inclusion in the above-referenced Dockets.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Jose Martin". The signature is written in a cursive style and is positioned above the printed name.

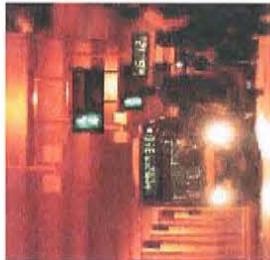
Jose Martin
Chief Executive Officer



TETRA in the United States

**Americas Spectrum Management Conference
The National Press Club, Washington DC
November 7, 2003**

Jose M. Martin
CEO



Agenda

- TETRA regulatory issues
- TI D-LMR in NPSPAC spectrum
- NPRM on NPSPAC spectrum



Regulatory Issues

About PowerTrunk Inc.

Focus



Experience



Technology

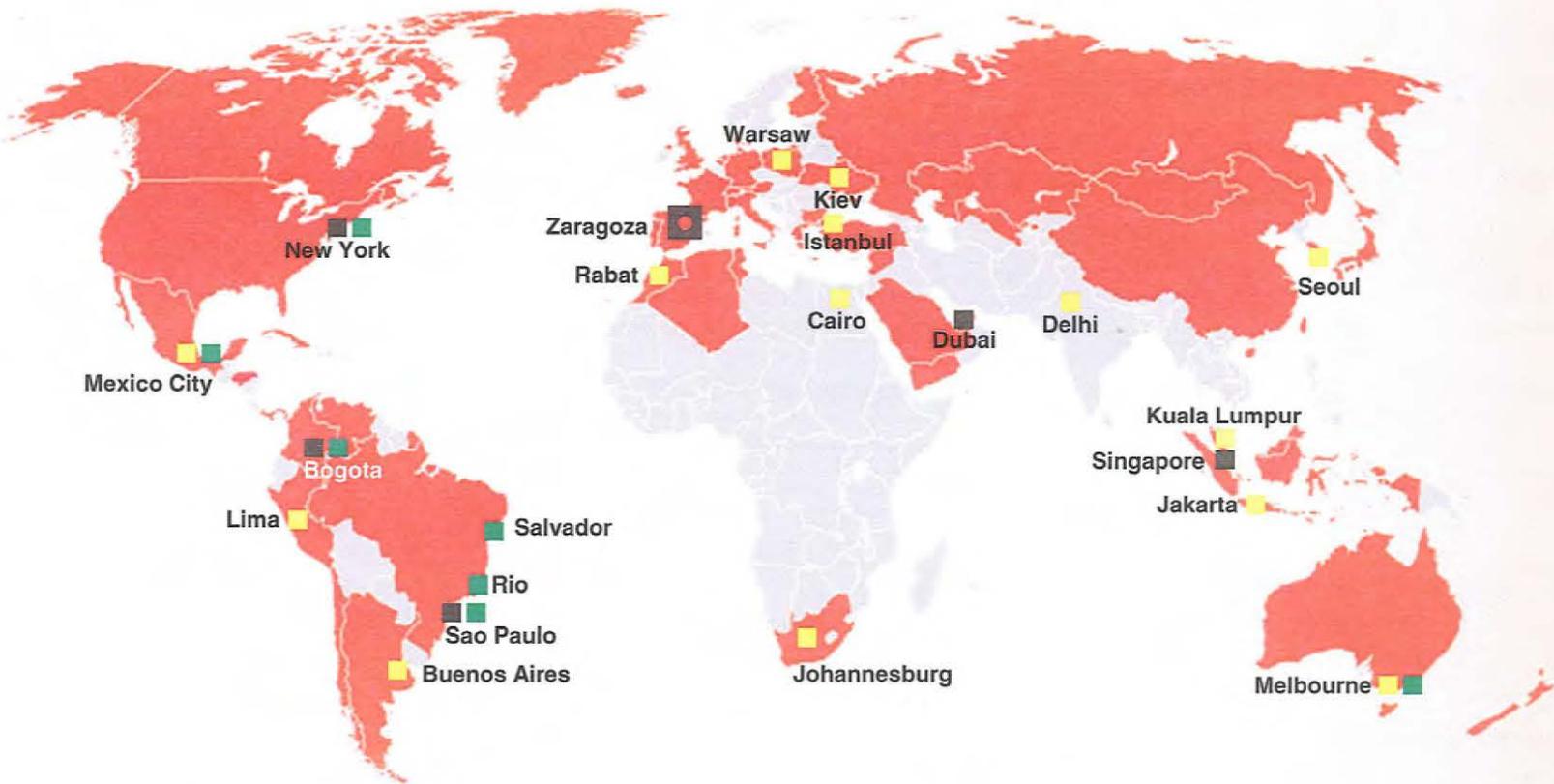


Flexibility



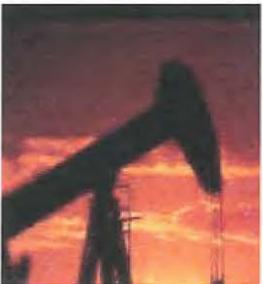
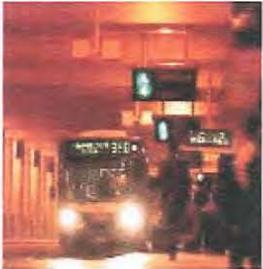
- Subsidiary of **Teltronic S.A.U.**, one of the five major global TETRA vendors.
- Reliable Ethernet/IP-based multi-technology TETRA/P25 and LTE/WiMax platforms.
- Technological independence from third parties; we develop and own 100 % of the technology.
- Readiness to customize.

PowerTrunk TETRA footprint



 Countries where PowerTrunk/Teltronic has been awarded TETRA contracts to date

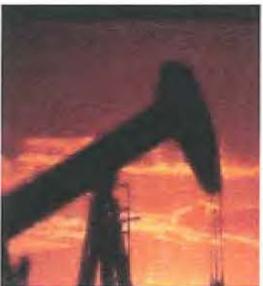
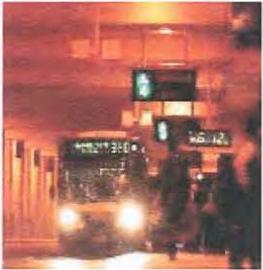
 Headquarters
 Subsidiary
 Commercial office
 Local Customer Service



What is TETRA



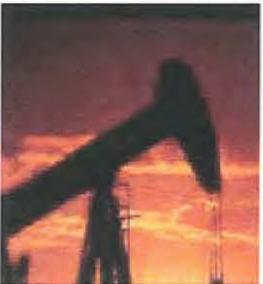
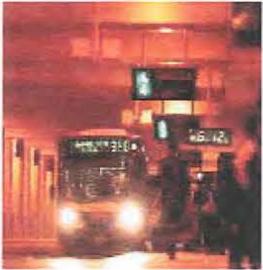
- A standard defined by ETSI in the 90's with contributions from Motorola, Nokia, Thomson, Alcatel and Marconi.
- 4-slot TDMA architecture over 25 KHz channels (6.25 KHz equivalent).
- $\pi/4$ -DQPSK, 2-bit symbol modulation for a raw bit stream of 36 Kbps multiplexed in four channels.
- Designed for use in 300 MHz - 1 GHz. Recently extended down to 130 MHz.
- Commercially available at global level in 380-400, 410-430, 450-470 and 806-870 MHz plus some special bands.
- TETRA systems deployed in over 127 countries to date.



What TETRA can offer

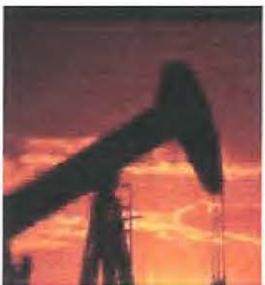
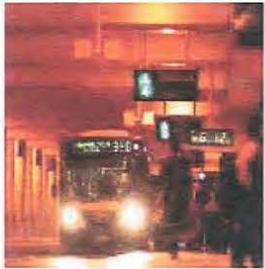
- Excellent cellular-like speech quality.
- Full-duplex and half-duplex voice calls.
- Private, group, broadcast and emergency calls.
- Status and short data messages (text, GPS, ...).
- IP packet data (4.8, 9.6 and 19.2 Kbps).
- Circuit data (7.2, 14.4 and 28.8 Kbps).
- Fast call setup (< 0.5 sec)
- Direct mode operation (DMO).
- Peripheral equipment interface (PEI).





Why TETRA was not available in North America

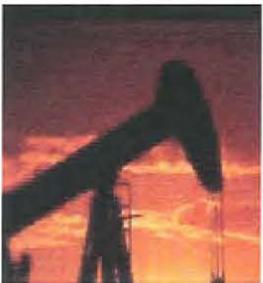
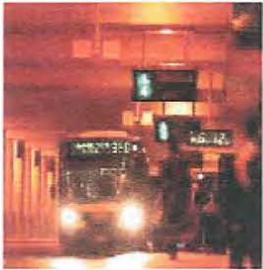
- Default RF TETRA signal does not meet two mandatory FCC 47 CFR 90 requirements:
 - Mask B (equipment with audio low pass filter). As defined by FCC 47 CFR § 2.1049 § 90.210.
 - Occupied bandwidth < 20 KHz. As defined by FCC 47 CFR § 2.1049 & 90.209.
- Therefore, no TETRA equipment was previously able to receive type acceptance from the FCC or Industry Canada in the past decade.



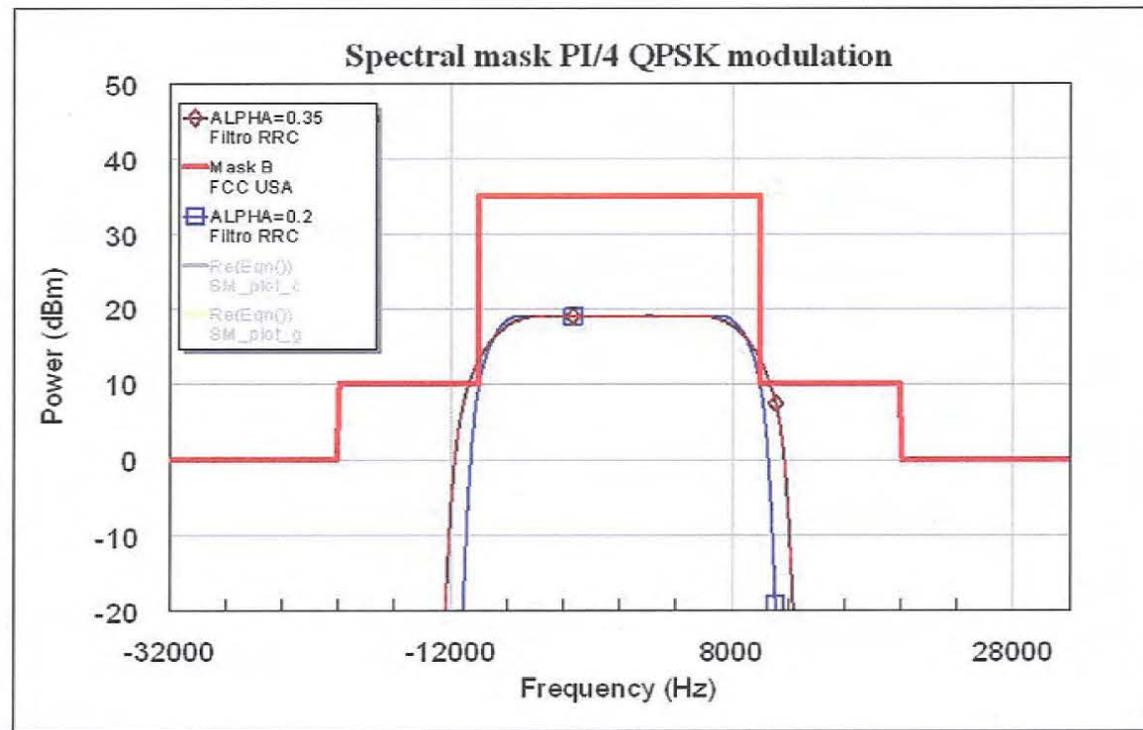
FCC granted approval for TETRA-interoperable D-LMR in all bands*

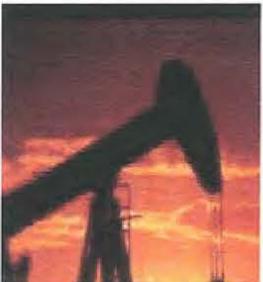
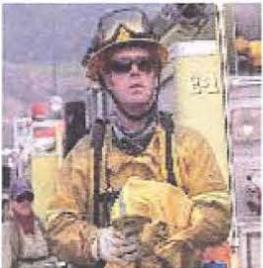
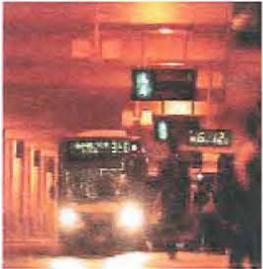
- PowerTrunk made a minor change in one of the parameters of the square raised cosine filter of the TETRA modulation.
- This change made TETRA-interoperable equipment compliant with FCC Part 90 rules.
- PowerTrunk repeater and subscriber radio equipment obtained FCC and IC type approvals for sale in the U.S. and Canada.
- Other vendors also obtained FCC certification for their TETRA equipment.
- PowerTrunk defined its equipment as TETRA-interoperable D-LMR (TI D-LMR).

- * Pending NPRM



TETRA w/alpha 0.35 = not compliant w/Mask B
TETRA w/alpha 0.2 = compliant w/Mask B





The FCC granted a waiver for ETSI TETRA in restricted bands

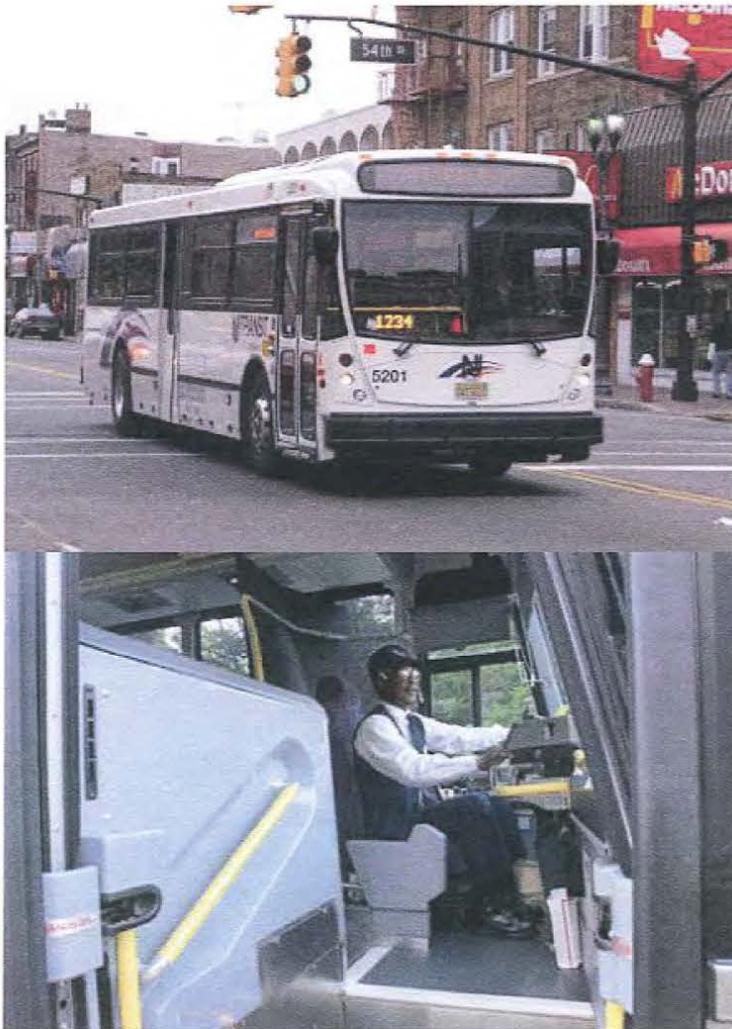
- April 26, 2011 - Upon TCCA's request the FCC issued a "notice of proposed rule making and order" which includes a waiver to allow ETSI TETRA to operate in certain bands without the emission restrictions as defined by Part 90 rules.
- The waiver was applicable to 450-470 MHz and 817-824 / 862-869 MHz sub-bands, with some restrictions.

NJ Transit Network

First TETRA network ever in the
United States



NJ Transit



- 35-site network in 809-817/854-862 MHz, including public safety pool frequencies.
- Over 4,000 buses and 200 light rail trains.
- Up to 27 CAD consoles.
- Integration with third-party AVL system.
- Integration with legacy VHF systems
- Integration with PABX/PSTN.
- Text messaging to / from cell phones.
- FCC license in force.



TI D-LMR in NPSPAC spectrum

NPSPAC - FCC requirements

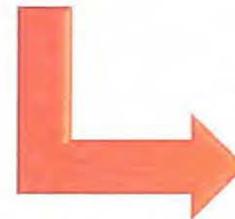
- Frequency band : 806-809 / 851-854 MHz
- Authorized Bandwidth: 20 KHz
- Channel spacing: 12.5 KHz



- Emission masks
 - Mask B (with audio low-pass filter)
 - Mask H (without audio low-pass filter)



- Interoperability requirements



FCC 90.209

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 25 ² .		
25-50	20	20
72-76	20	20
150-174	17.5	1,3 20/11.25/6
216-220 ⁵	6.25	20/11.25/6
220-222	5	4
406-512 ²	16.25	1,3 20/11.25/6
806-809/851-854	12.5	20
809-824/854-869	25	20

FCC 90.210

Frequency band (MHz)	Mask for equipment with Audio low pass filter	Mask for equipment without audio low pass filter
Below 25 ¹	A or B	A or C
25-50	B	C
72-76	B	C
150-174 ²	B, D, or E	C, D, or E
150 Paging-only	B	C
220-222	F	F
421-512 ²	B, D, or E	C, D, or E
450 Paging-only	B	G
806-809/851-854	B	H
809-824/854-869 ³	B	G
896-901/935-940	I	J

FCC 90.203 (i)

(i) Equipment certificated after February 16, 1988 and marketed for public safety operation in the 806-809/851-854 MHz bands must have the capability to be programmed for operation on the mutual aid channels as designated in § 90.617(a)(1) of the rules.

FCC REQUIREMENTS



PowerTrunk D-LMR Equipment

Frequency band :
806-809 / 851-854MHz



Certified to operate on NPSPAC spectrum*.

Authorized Bandwidth:
20KHz (90.209)



Meets the authorized bandwidth < 20 KHz

Channel spacing:
12.5KHz (90.209)



Needs proper frequency coordination the same way other technologies do for operation on NPSPAC frequencies.

Emission masks :
Mask B (90.210)



Uses audio low-pass filters in its modulation block (i.e. it's eligible for Mask B certification in NPSPAC spectrum).*

Interoperability
requirements (90.203 (i))



IQ modulation (used by PowerTrunk) allows generating analog FM signals for operation on mutual aid channels.



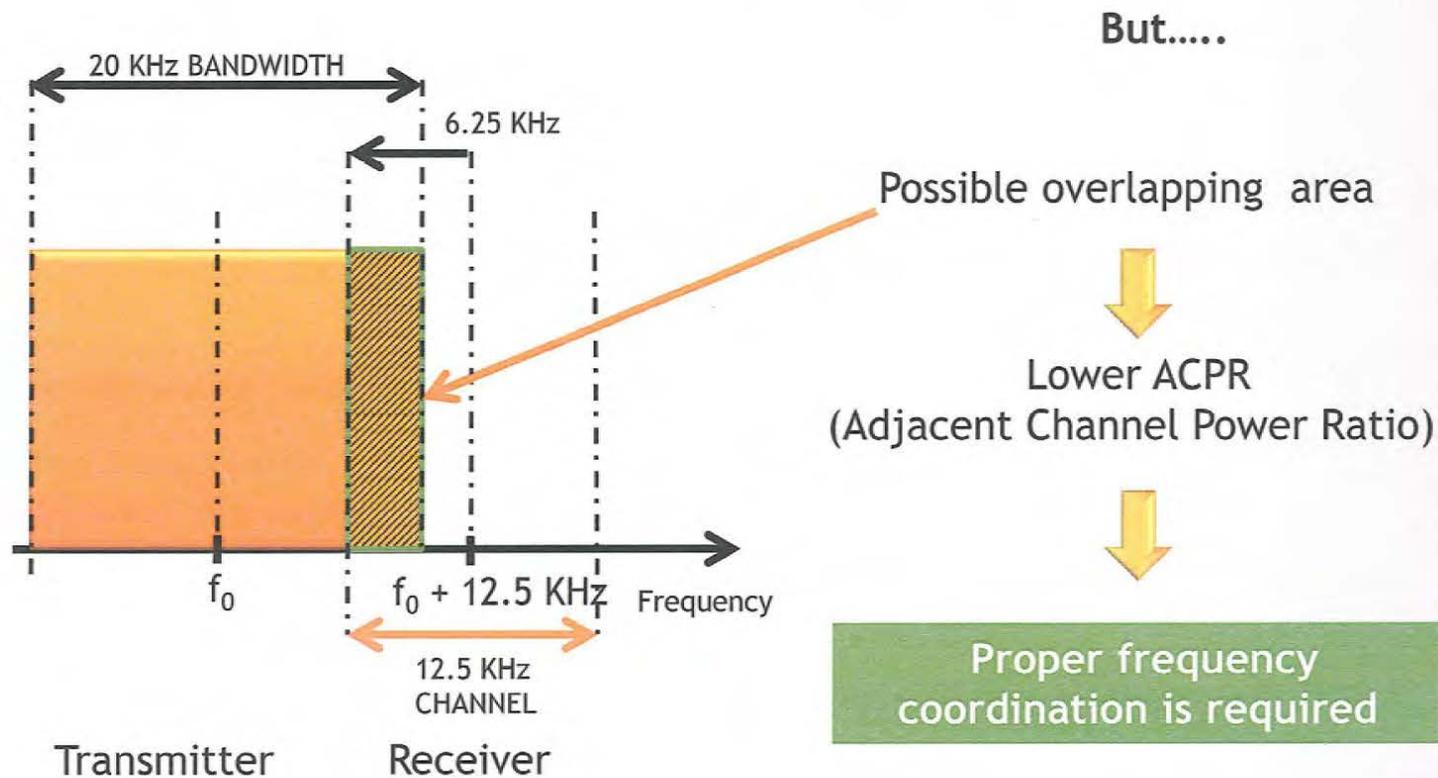
PowerTrunk has got through FCC certification for analog-FM-capable TETRA and TI D-LMR equipment in early 2013.

*Pending NPRM

PowerTrunk TI D-LMR equipment could be used in NPSPAC frequency bands pending on an NPRM underway

NPSPAC - Interference & Frequency Coordination (I)

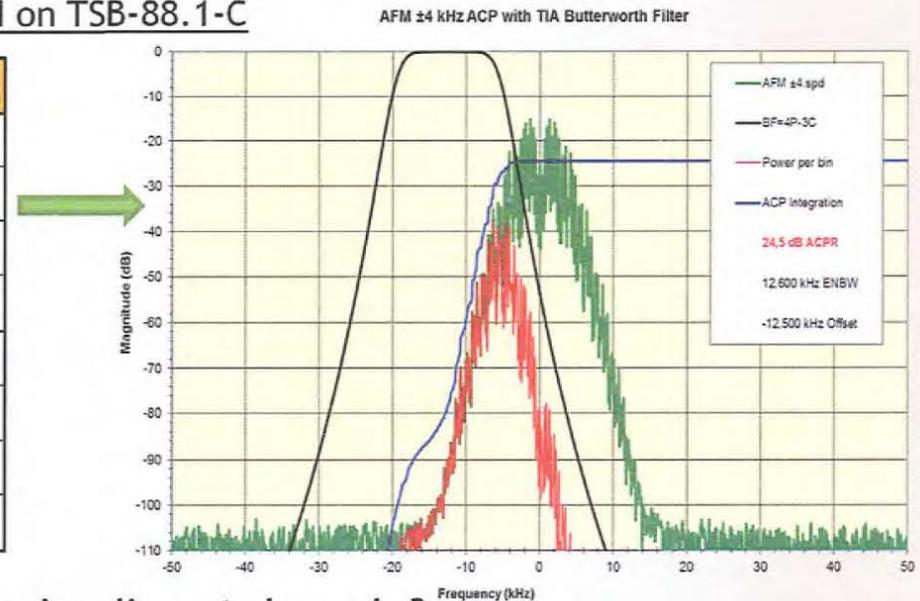
- FCC 90.209 -> NPSPAC 806-809 / 851-854MHz
 - Authorized Bandwidth: 20 KHz
 - Channel spacing: 12.5 KHz (instead of 25 KHz) → **More spectrum-efficient**
(More channels in the same frequency range)



NPSPAC - Interference & Frequency Coordination (II)

ACPR (Adjacent Channel Power Ratio) analysis based on TSB-88.1-C

Victim Receiver	Channel Spacing	Technology / Transmitter	ACPR (dB)
Analog FM (4KHz) ENBW = 12,.KHz	12.5KHz	Analog FM (5KHz)	≈ 19
		Analog FM (4KHz)	≈ 24
		F4GFSK (OpenSky)	≈ 20
		D-LMR PowerTrunk	≈ 8
	25 KHz	Analog FM (5KHz)	≈ 82
		Analog FM (4KHz)	≈ 82
		F4GFSK (OpenSky)	≈ 62
		D-LMR PowerTrunk	≈ 71



What ACPR is required to avoid potential interference in adjacent channels ?

Example: pursuant TIA-603-C Section 3.2.14 for $f_0 > 512$ MHz and BW=20 KHz, **ACPR > 60 dB** is required.

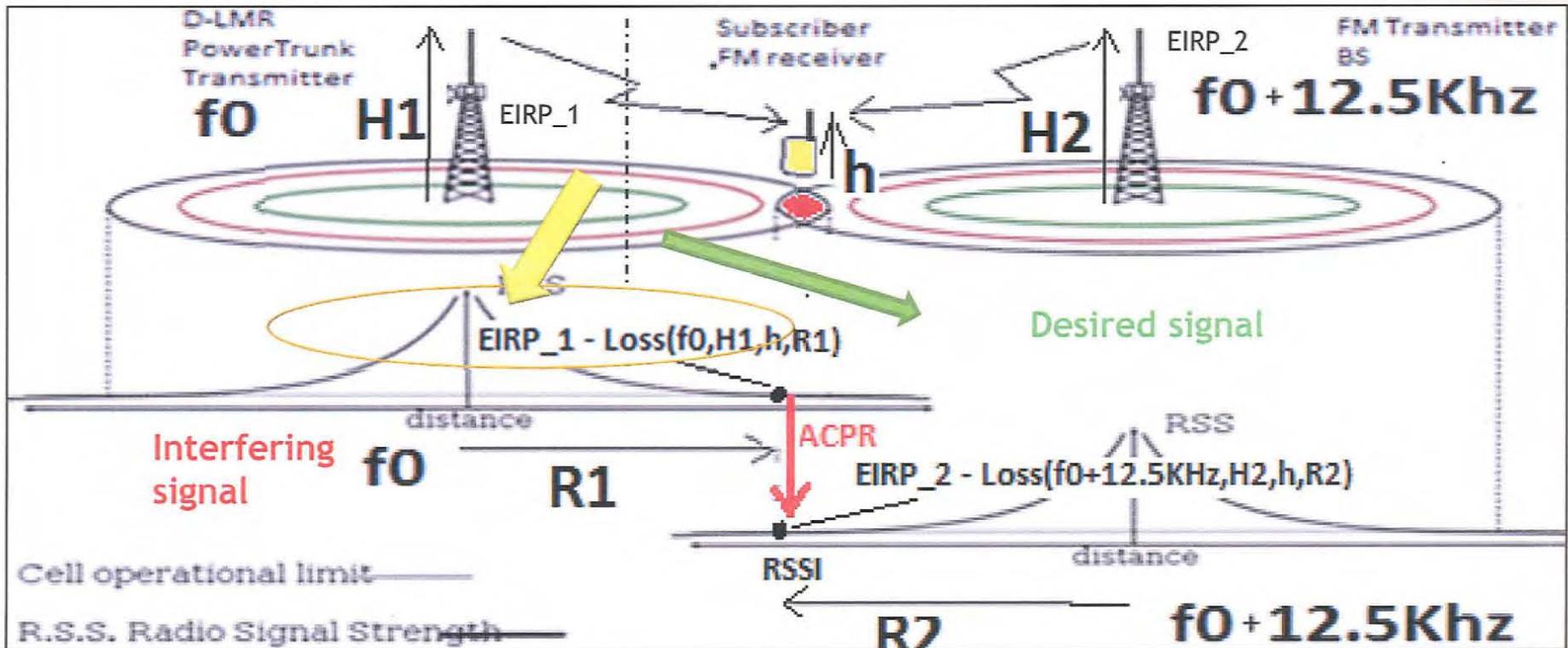
Table 30 - Adjacent Channel Power Ratio

Channel Bandwidth	Measurement Bandwidth	Fixed Station (dB)	Mobile Station (dB)	Portable Station (dB)
≥ 25.0 kHz	16 kHz	70 if < 512 MHz 60 if > 512 MHz	70 if < 512 MHz 60 if > 512 MHz	70 if < 512 MHz 60 if > 512 MHz
20.0 kHz	14 kHz	70 if < 512 MHz 60 if > 512 MHz	70 if < 512 MHz 60 if > 512 MHz	70 if < 512 MHz 60 if > 512 MHz

Therefore, all technologies shown above may cause harmful interference in NPSPAC frequency bands so they all need frequency coordination (including OpenSky)

NPSPAC - Interference & Frequency Coordination (III)

Distance between systems and type of antennas shall be considered:



EIRP: Equivalent Isotropic Radiated Power.
Loss(..): Propagation Losses as a function of frequency, antenna heights and distance.

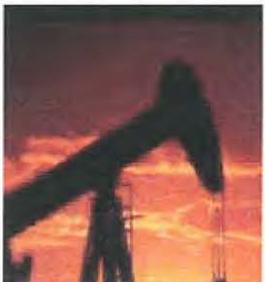
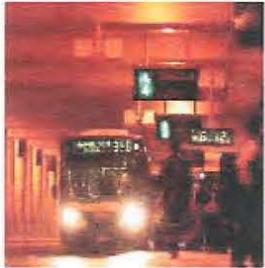
DISTANCE "R1" CAN BE CALCULATED TO AVOID INTERFERENCE

NPSPAC - Spectrum efficiency vs. Frequency coordination

PowerTrunk TI D-LMR practically doubles the data throughput offered by other LMR technologies in the United States (36 Kbit/s per 20 KHz of bandwidth vs. 19.2 Kbit/s per 20 KHz of bandwidth). Those agencies in need of supporting advanced applications (e.g. state-of-the-art AVL) would need half the frequencies to achieve the same performance by using PowerTrunk equipment (let alone much better speech quality).

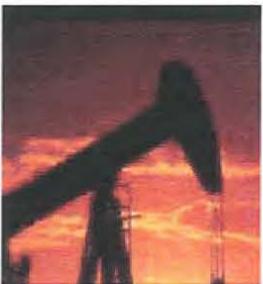
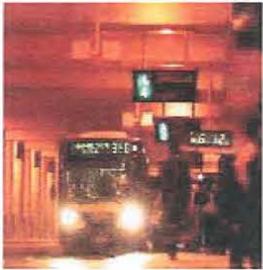
Therefore, **the need to coordinate a greater number of frequency blocks for a less spectrally efficient network compared to PowerTrunk's D-LMR presents its own challenges to an RPC (e.g. coordinating eight frequencies could be much more difficult than four or five, even on the same site).**





October 2013 Update (I)

- In September 2012 the FCC issued a Report and Order to confirm that ETSI TETRA is accepted on 450-470 MHz and 809-824/854-869 MHz (excluding NPSPAC).
- The NJ Transit network has been deployed including public safety pool frequencies in 809-817/854-862 MHz under an FCC license.
- Motorola Solutions' Petition for Clarification was dismissed by the FCC (i.e. it was confirmed that public safety pool frequencies are open to ETSI TETRA).
- PowerTrunk's certificates for TI D-LMR in NPSPAC (806-809/851-854 MHz) remained in force as TI D-LMR is compliant with Mask B (rule 90.210).



October 2013 Update (II)

- The FCC published a Notice of Proposed Rulemaking upon Harris's request. The NPRM cites Harris's allegations that Mask B shall not be accepted in NPSPAC. Therefore it is proposed that rule 90.210 shall be changed to make Mask H mandatory. The NPRM froze PowerTrunk's certificates in NPSPAC.

PowerTrunk



Thank You

Jose M. Martin

jmartin@powertrunk.com

Copyright 2013 © PowerTrunk Inc. All rights reserved