

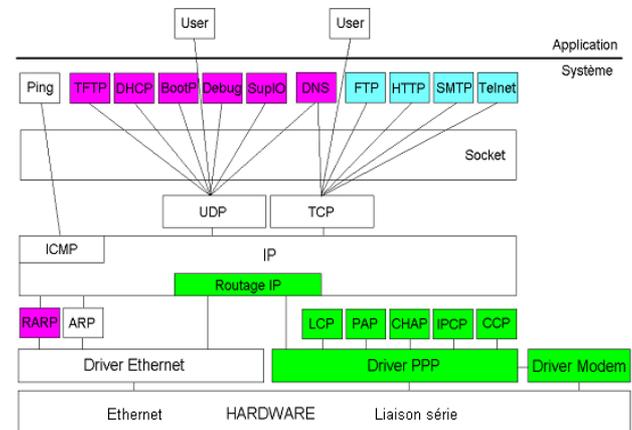
How TV Split From Radio... And How They Will Now Converge

Yet another way IT/IP changes Everything

**Where Continued Convergence In
Broadcast Technology is Likely**

What's on the Agenda

- How Broadcasting “Specialized”
- How Broadcasting “Converges”
- How to Manage in this World





Rethink Possible



From Radio to TV

YOU HAVE BEEN WATCHING INDIANA'S BEST

340 BLUFF RD. INDIANAPOLIS, INDIANA

Making Digital Broadcasting Work.



	<p>BC-1F - 1 kW - 1949 In 1953, this was \$5,950 WGSM - Huntington, NY</p>
-------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------

Major Product Families



NXSeries MW
25 kW–2.0 MW

Advanced User Interface (AUI)



VSSeries FM
300 W–2.5 kW



NTSeries UHF
150 W–500 W



NVSeries FM
3.5 kW–88 kW



NV^{LT}Series FM
3.5 W–40 W



GVSeries FM
3.5 kW–88 kW

Major Product Families



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TV

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3.5 W–40 W



GVSeries FM
3.5 kW–88 kW

While Radio Transmitters
have become smarter, TV
transmitter are all pretty dumb

Advanced Solutions



AUI
PUSH RADIO™
Power Saving
MPX over AES
Updater/Manager
PhoneHome™
HD PowerBoost
HD Multiplex
-14 dB / -10 dB
N+1

PUSH RADIO™



Talk to Sales
GET A QUOTE



Sign
Our!

Building on the local audio storage capabilities of Nautel's VS transmitters and leveraging the AUI control system, Nautel PUSHRADIO™ allows networked broadcasters to dramatically reduce program distribution costs, improve reliability and facilitate local content.

From anywhere in the world, content can be delivered via low-cost Internet connections, and different content can be delivered to each transmitter, allowing each site to have local content in its programming. You can set-up basic automation capabilities, send new content as audio files, and send updated playlists to the transmitter, which then plays the content locally.

Nautel PUSHRADIO is being developed for VS and NV-T Series transmitters.



Radio has content aware Transmitters, with built in:

- DR
- Insertion
- Branding

Nautel PUSHRADIO™ Innovation

Even
MORE



Scheduler • new
Play lists • new
Push Radio • new

A scheduler allows broadcasters to automate switching audio inputs, playlists, processor or other settings based on time and date rules.

A powerful playlist editor provides drag and drop editing.

ENCO Push Radio™ Interface

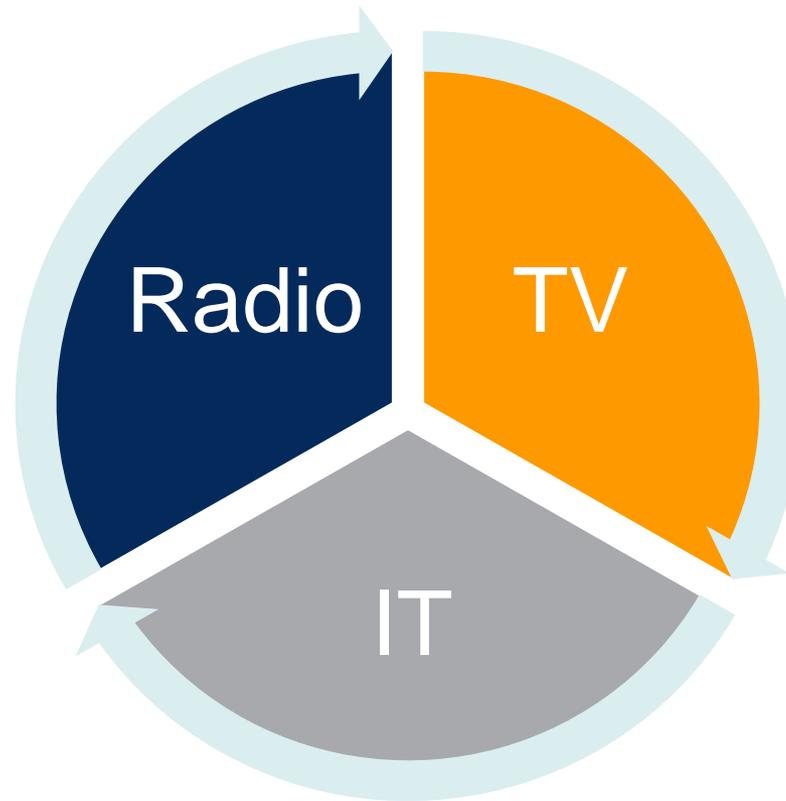
The ENCO Push Radio interface provides audio delivery via the ENCO DAD Automation platform, an industry leader in program automation. The system automatically updates files and playlists on each transmitter. It also pulls back 'as played' logs and reconciles the logs with music and traffic schedulers. It is ideal for educational or religious broadcast networks who have transmitters spread over a wide geographic area.

The ENCO Push Radio interface operates on any VS Series or NV-T Series transmitter.



[Learn more about Push Radio With ENCO Automation Interface >>](#)

Learning (stealing) from Adjacent Technologies is Innovation





History



Early History



ARGONI
art. of wireless telegraphy.

H I S T O R Y
of
R A D I O
TO 1926



By GLEASON L. ARCHER, LL.D.
President of Suffolk University

The American Historical Society, Inc.

NEW YORK

History of Radio to
1926
Published 1938

Time Line

- 1925 10 kHz is a lot of Bandwidth to Broadcast
- 1948 Pictures – A Wonderful New Radio Feature
- 1950 The Great Broadcasting Schism
 - Radio vrs TV
- 1980 IT Disintermediation
 - RF vrs IT
- 1990 Digital Media
 - Film, Tape, Discs collapse into Files
- 2011 Pictures – A Wonderful New Radio Feature
 - 1948 Do Over

Radio with a Light

- TV was NOT a new medium... It was a FEATURE



Adding Pictures

- Jack Benny

- 1932 NBC Radio
- 1949 CBS Radio & KTTV
- 1940 CBS TV
- 1964 NBC TV
- 1965 Sign Off



- Amos and Andy

- 1934 WMAQ/El Mirador
- 1954 CBS-TV
- 1965 Sign Off



- Lone Ranger

- 1933 WXYZ
- 1949 TV
- 1957 Sign Off



Adding Pictures

- **Dragnet**

- 1949 Radio
- 1957 TV
- 1959 Sign Off

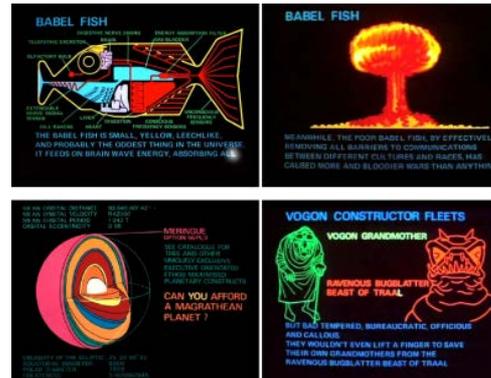
- **Ozzie & Harriet**

- 1945 Radio
- 1955 TV
- 1962 Sign Off



Adding Pictures

- The Mighty Boosh
- Love Line
- Hitchhikers Guide
- Ira Glass



Schism



- TV engineers came from Radio or De Vry
- SMPE founded 1916 becomes SMPTE in 1950
- TV Destined to Kill Movies and Radio:
 - Why listen when can watch?
 - Why go out when the movie is in the living room?



Ennes Books

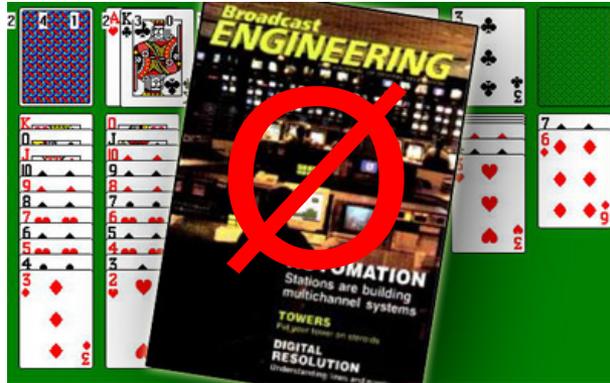


SMPE Becomes SMPTE

member of this Society. We have, therefore, much incentive to offer to the television engineer to join with us; and on our side, there is much to be gained by this union, both from the point of view of society economics and from that of service to the industry. It is for these basic reasons that your Board, after due committee consideration, decided to recommend to the membership that the name of the Society be changed to "Society of Motion Picture and Television Engineers," and that the founders and developers of this new allied art be actively encouraged to take part with us in developing a larger and more effective service. It is my sincere personal belief that such a change will profit the Society and the industry, and I hope that with your enthusiastic support of the enlarged program which I have just outlined, time will prove the wisdom of this course.



Earl J. Sponable, President SMPE
Oct 10 1949, Hollywood
3000 members



Radio

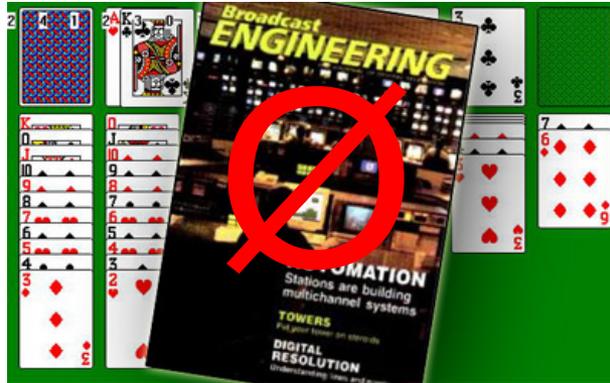


Broadcasting



TV





Radio



Broadcasting



TV





Engineering Level Certifications

- [Certified Broadcast Technologist® \(CBT®\)](#)
- [Certified Audio Engineer® \(CEA®\)](#)
- [Certified Video Engineer® \(CEV®\)](#)
- [Certified Broadcast Radio Engineer™ \(CBRE®\)](#)
- [Certified Broadcast Television Engineer™ \(CBTE®\)](#)
- [Certified Broadcast Networking Engineer™ \(CBNE™\)](#)
- [Certified Senior Radio Engineer™ \(CSRE®\)](#)
- [Certified Senior Television Engineer™ \(CSTE®\)](#)
- [Certified Professional Broadcast Engineer® \(CPBE®\)](#)

Convergence

TV Without Pictures

TV Without Pictures

- TV Radio
 - (TV radio or TV band radio or TV audio Radio)
 - Last known is Sony Analog
 - Most VHF only
 - Few Car Versions
 - No DTV Version
 - 8 VSB has mobile issues
 - Displays are cheap



TV Without Pictures

One
Remains in
Production



TV Without Pictures



- TV on Radio

- WCBS Radio Runs *60 Minutes*
- So Does Montreal CJAD



- Radio on Internet

- TuneIn.Com
- NPR's "Ted Talks"



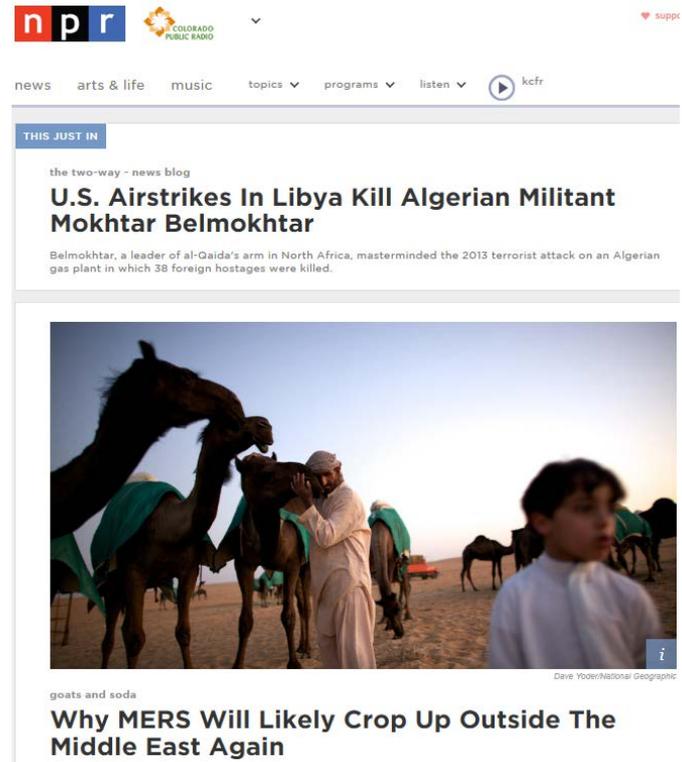
Convergence

Radio with Pictures

Radio With Pictures

Radio News Drives Listeners to Web

- NPR in particular... has video clips and stills with most stories it tags to the Web.



The screenshot shows the NPR website interface. At the top, there are logos for NPR and Colorado Public Radio. Below the logos is a navigation bar with links for news, arts & life, music, topics, programs, listen, and a play button icon. A "supp" link is visible in the top right corner. The main content area features a "THIS JUST IN" section with the headline "U.S. Airstrikes In Libya Kill Algerian Militant Mokhtar Belmokhtar". Below the headline is a sub-headline "the two-way - news blog" and a short paragraph of text. A large photograph shows a man in a white thobe and ghutra tending to a camel in a desert setting. A young boy is visible in the foreground. Below the photo is a caption "goats and soda" and another headline "Why MERS Will Likely Crop Up Outside The Middle East Again".

Radio With Pictures

“Public radio’s music discovery stations are incredibly prolific producers of high quality video....”

--Erik Langer, president

VuHaus

The screenshot shows the iTunes Preview page for the VuHaus app. At the top, it says "iTunes Preview" and "Overview Music Video Charts". The main heading is "iTunes is the world's easiest way to organize and add to your digital media collection." Below this, there's a message: "We are unable to find iTunes on your computer. To download the free app VuHaus - Come In. See The Music, by Public Media Company, get iTunes now." There are buttons for "Have iTunes" and "Free Download".

The app's name "VuHaus - Come In. See The Music." is displayed, along with the developer "By Public Media Company". A description follows: "View hundreds of rare live performances in intimate settings, exclusive interviews, plus live video streaming of concerts and events." There are also "Screenshots" of the app interface, showing a performance by Beck and another by John Legend.

Additional details include: "View in iTunes", "This app is designed for both iPhone and iPad", "Free", "Category: Music", "Released: May 13, 2015", "Version: 1.0", "Size: 23.7 MB", "Language: English", "Seller: Public Media Company", "© 2015 VuHaus", "Rated 5+ for the following: Infrequent/Mild Profanity or Crude Humor", "Compatibility: Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch. This app is optimized for iPhone 5, iPhone 6, and iPhone 6 Plus.", "Customer Ratings: We have not received enough ratings to display an average for the current version of this application.", and "YOU MIGHT ALSO LIKE" section.

The screenshot shows the VuHaus website interface. At the top, there's a navigation bar with "VUHAUS", "BROWSE", "WATCH LIVE", and "VU/CITY [1]". There are also "Search" and "Queue" buttons.

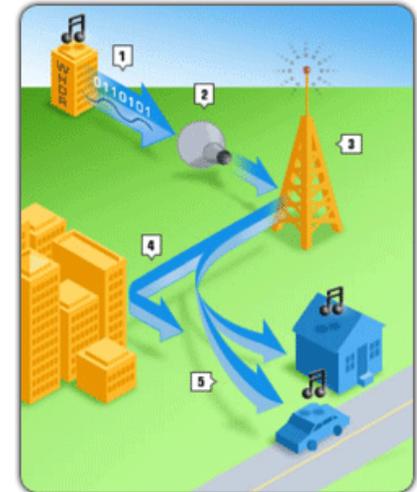
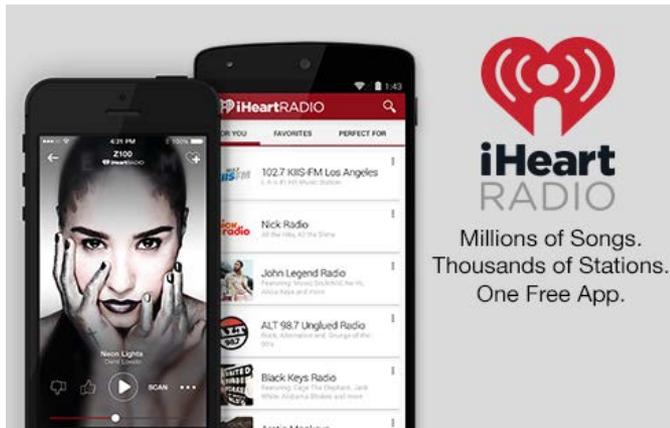
The main content area is titled "WHAT'S NEW" and features a grid of video thumbnails. Each thumbnail shows a live performance and includes the song title and artist name. The thumbnails are arranged in three rows and three columns.

- Row 1: "Basically" by The Roots, "We Need Love" by The Roots, "The Moon" by The Roots.
- Row 2: "Say" by The Roots, "Made My Mind Up" by The Roots, "Falling From The Sky" by The Roots.
- Row 3: "Trumpet" by The Roots, "Drums" by The Roots, "Guitar" by The Roots.

Radio With Pictures

Video On HD Radio

- Clear Channel's -- Artist Experience in (June 2010)
- iBiquity's -- *Advanced Application Services over HD Radio* (1999)



SSTV - LDTV



Kind of TV on an Audio Channel

Convergence

Radio with TV

Radio With TV “ATSC Radio”

ATSC “Radios”
have been
built



Soundstream TV- ATSC-MH

Item# 28074

Condition: Brand New

[Review this product](#)

Digital TV Tuner for Soundstream INGENIX Series Source Units

 AUTHORIZED DEALER

MSRP: \$229.95

Savings Of: \$60.00 (26%)

 Add Extended Warranty

Your Price \$169.95

No plan selected

ADD TO CART

Free Shipping On This Item

Radio Reading Service for the Blind
HD-secondary Service
Streaming
TV “SAP”

Radio With TV

-Why ATSC Radio?

- Hotel Radios are Pieces of S*&%
 - Interference
- Several Internet Services for Hotels
 - Hotel Internet is S*&%



Radio With TV

-World Standards



- DTMB (Digital Terrestrial Multimedia Broadcast)

ISDB-T

- ISDB-Tsb is the terrestrial digital sound broadcasting specification.



- DMB/DAB

DVB
Digital Video
Broadcasting

- DVB-T/DVB-H

Convergence

Radio with TV
Internet

Radio with TV - Internet

- Bob and Tom



It's Here. Smarter Home Security. "Watch out for long-term contracts and industry 'gotchas.' Protect your home the smart way with SimpliSafe." -Bob & Tom

SimpliSafe SHOP NOW

- Howard Stern



- Prairie Home Companion



Video Archive

Watch Garrison, the Royal Academy of Radio Actors, The Guy's All-Star Shoe Band, and our special guests in action. Each week we'll add new videos from rehearsals, live broadcasts, and special events.

PLAYLIST 2014 - 2015 Season

0:00 / 1:54

Convergence

The Technology Gap
Closing

What's Alike

- Data Transmission Tools
 - Reed Solomon – FEC
 - Interleave
 - Randomizer
 - Trellis Encoding
- Business Model
- Free - OTA

What's Different

Radio

- Hybrid Digital
- Has Secondary Service
- Built for Doppler
- EVM 10%
- Steady Progression to all Digital

TV

- Big Switch to Digital
- DMA
- Mobile Difficult Now
- EVM 4%
- Change = Dongle



Things You Don't See Much of in Radio

- Statistical Multiplexing
- Expensive Video Encoding/Decoding
- PSIP - EPG
- Extensive Ensembles
- Timing – PCR, Process Latency, SFNs...
- Multitudes of Content Formats
- Encryption - Conditional Access
- CALM Audio Loudness Compliance
- EAS Crawls
- Closed Caption
- Descriptive Audio

Things You Don't See Much of in Radio

- Content Ratings – Parental Controls
- Big Bandwidth
- UHF
- Really Complex Filters
- High Value Spots
- SCTE 30 (Splicing)
- SCTE 35 (Triggers)
- SCTE 104 (Automation Interface Triggers)
- OOB DTMF triggers

Things You Don't See Much of in TV

- Universal Streaming
- Disc Jockeys
- Call-In Shows
- Sustaining (not block) programming
- Voice Tracking

Cameras Are ~ Free



Ads ⓘ

			
G1WH 1080P HD Car Dash ... \$62.95 Spytecinc	Insteon 2864-22 Indoor HD Wir... \$99.99 Build	Touchscreen HD Camcorder \$249.99 Sharper Image	HP Life Cam Full HD Wi-Fi Actio... \$129.95 HSN
			
Canon VIXIA HF G30 HD Camc... \$1279.00 Buydig.com	Top Dawg HD DVR Dash Ca... \$69.99 Galls Inc	D-Link Cloud Surveillance N... \$169.99 NeweggBusin...	Bushnell 8Mp Trophy Camer... \$499.00 \$599.95 L.L.Bean

IP/IT Barely Cares if it's Audio or Video



A screenshot of a Skype profile page for Fred Baumgartner. The browser address bar shows "Skype™ - k0fmb@arrl.net". The page has a navigation menu with "Skype", "Contacts", "Conversation", "Call", "View", "Tools", and "Help". The profile section includes a search bar, a home button, and a "Call phones" button. The "CONTACTS" section is set to "RECENT" and shows a list of contacts: "kimhaesoo" and "Chuck Kelly" under "Wednesday", and "Chuck Kelly, Andy Berry, John Whyte..." under "Tuesday". The profile picture of Fred Baumgartner is shown, along with his name and account information: "Accounts: k0fmb@arrl.net, live:k0fmb, Manage". His mood is "Enter mood message". Contact information includes "Mobile phone: +13033257988", "Home phone: +13033257988", and "Office phone: +13033257988". There is a "Show full profile" link. Below the profile, there are sections for "Manage my account" (with a right arrow), "Credit" (with a dollar sign icon), and "Subscriptions" (with a calendar icon). The "Credit" section lists benefits like "Call who you want, when you want", "Call mobiles and landlines worldwide", and "Send text messages and access WiFi hotspots". The "Subscriptions" section lists benefits like "Call a lot? Save a lot...", "Lowest calling rates", and "No long-term commitments".

ENG Shoot in HD?



TV

- iPhone = Camera
- iPhone = Prompter
- iPhone = IFB
- iPhone = Wireless Mic
- iPhone = Lighting



Radio

- Enco's iDAD

Convergence

Bandwidth

Bandwidth

6 MHz
19 Mb/s

0.03 MHz
.036 Mb/s

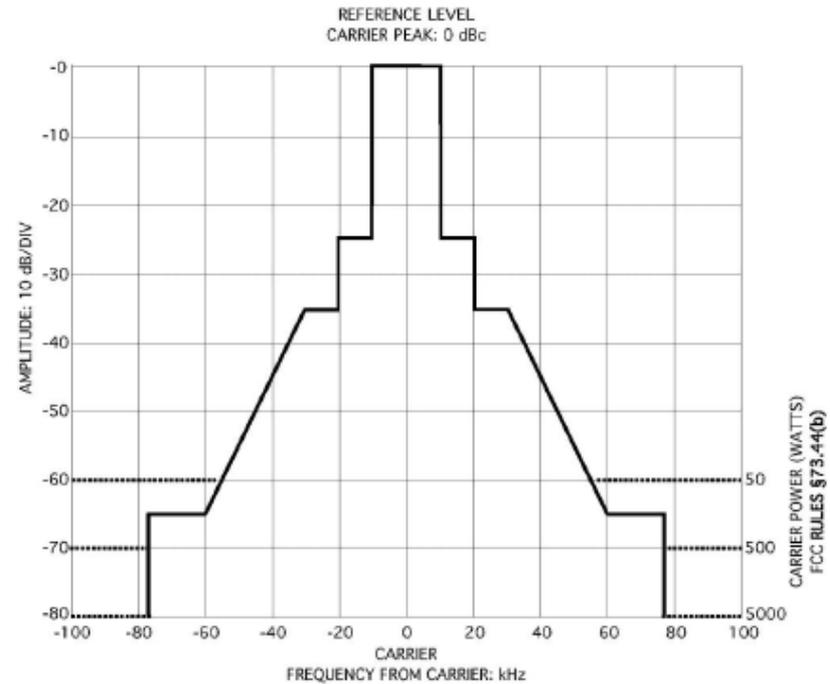
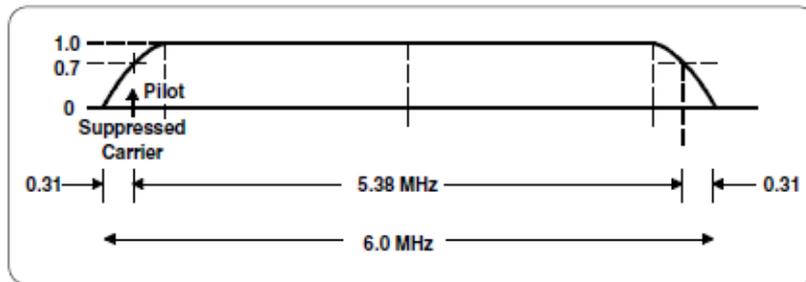


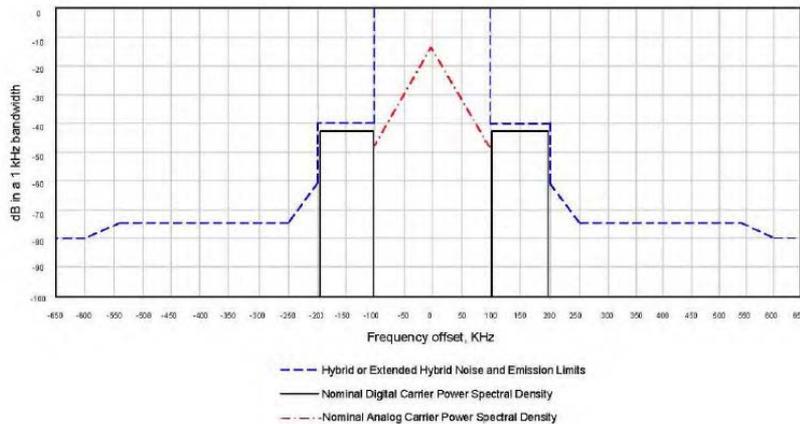
Figure 1. Analog AM Broadcast RF Emission Limits

Bandwidth

0.2 MHz

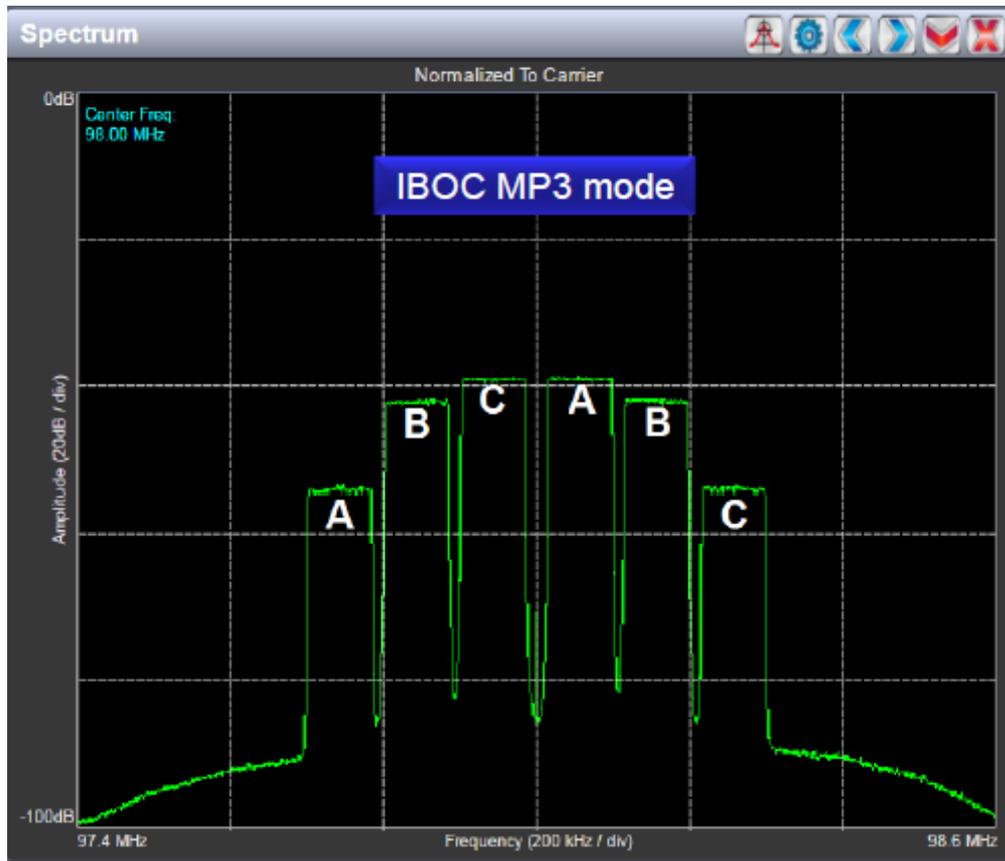
Reasonable Throughput

- 40 kb/s
- 100 kb/s



FM Multiplex

3x123.2 kbps => 369.6 kbps



nautel					
FM XS	FM MP3	FM DV & NV	AM XB	AM NX	HD NX
5.2 - 2.3 kW	2.4 - 40 kW	2.5 - 60 kW	1 - 12 kW	5 - 30 kW	100 kW - 2 MW

HD Multiplex

Award-winning Nautel HD Multiplex is a specially efficient and energy efficient means to implement all-digital radio utilizing a multiplexed implementation of IBOC's Clear™ HD Radio™ transmission technology. It enables the placement of up to 15 audio streams or stations within 500 kHz of signal bandwidth or up to nine audio streams in 400 kHz of signal bandwidth.

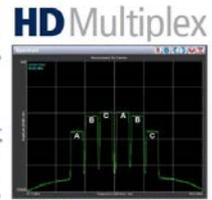
This new experimental technology allows the combination of multiple independent IBOC engine modulators into a single HD FloorStack direct baseband reduction engine, permitting one or more IBOC stations to be multiplexed using a single transmitter and subsequent antenna system. Nautel's HD FloorStack™ uses an intelligent peak to average power ratio algorithm - PAPR - to increase HD Radio power output while at the same time increasing efficiency.

The original IBOC configuration is capable of carrying up to three times the standard IBOC content. The methodology also maintains backward compatibility with existing receivers by ensuring the standard subband channel separation within the multiplexed signal.

HD Multiplex builds on the advantages of existing IBOC technology. Existing IBOC can carry up to five audio streams in the 200 kHz frequency portion dedicated to a single FM broadcast. Another IBOC advantage is its superior C/N ratio of only 4.0 dB compared to 20.32 dB in FM. This allows much better frequency reuse and that spacing of stations. HD Multiplex further increases the spectral efficiency by implementing multiple IBOC signals and using all the allocated frequency space without any waste.

Comparable coverage to an FM transmitter would only require 60-70% of the FM transmitter TPO.

HD Multiplex is experimental and would require an



15 Channels in 600 kHz
9 Channels in 400 kHz
All Digital Radio



From Radio to TV

Making Digital Broadcasting Work.

Convergence

Mind Experiment

Convergence

Side Trip - Spectrum

Spectrum

- MW-LF – Go For The Horizon & Beyond
- HF – Go Everywhere or Nowhere
- VHF – Best Rural
- UHF – Best Urban
- SHF – Bulk of All BW
- EHF – Best Remote Controls

Spectrum

- MW-LF – Go For The Horizon & Beyond 
- HF – Go Everywhere or Nowhere
- VHF – Best Rural 
- UHF – Best Urban 
- SHF – Bulk of All BW
- EHF – Best Remote Controls

Radio Coverage Tool


[Talk to Sales
GET A QUOTE](#)

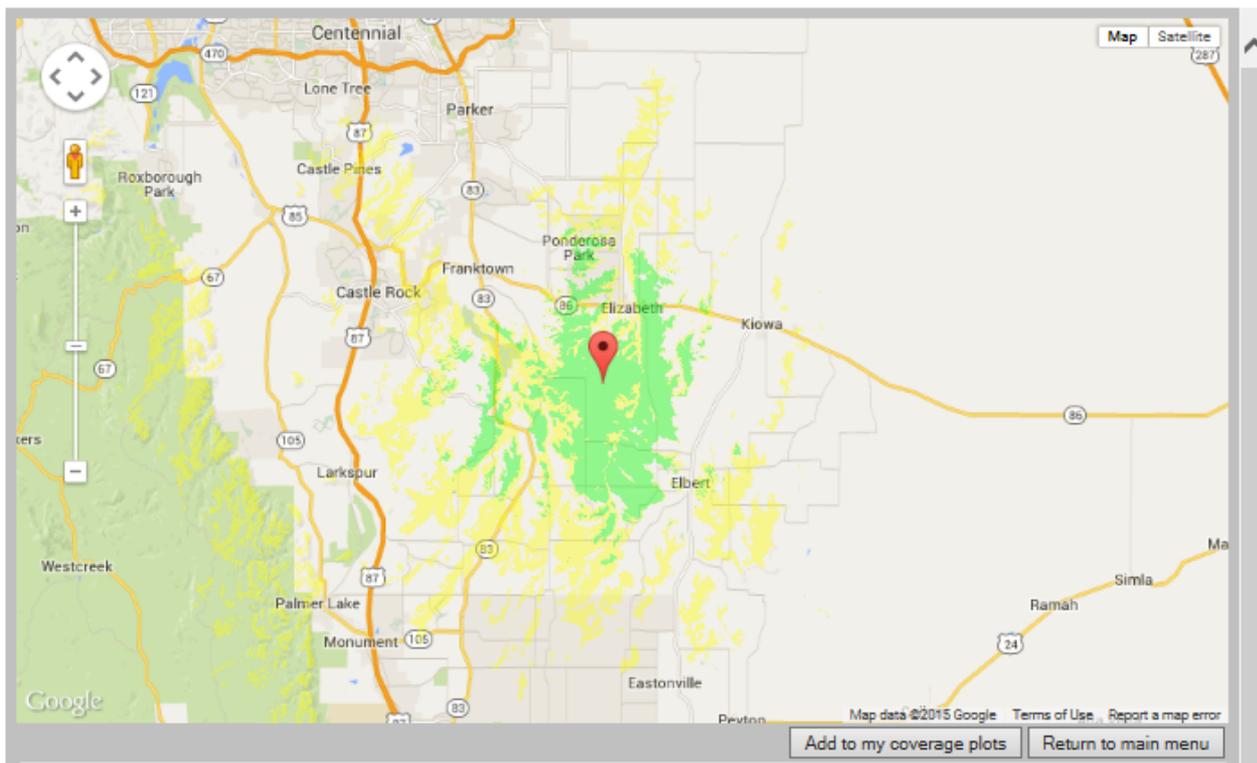
[Sign up for
Our Newsletter](#)

[Visit our
eStore](#)

[Send to
a Friend](#)

To begin using the radio coverage tool, set up a new transmitter site in the 'New Transmitter Site' menu. You can now create a coverage study at this site by selecting 'New Coverage Plot' or 'New Point-to-Point Link' and specifying your transmitter and antenna details and submitting (to create a new link you will need to create two transmitter sites). Saved coverage studies and links can be found in the 'My Coverage Plots' and 'My Point-to-Point Links' menus. Your coverage studies will automatically be saved in your account.

The radio coverage tool is intended to aid broadcasters in analyzing the approximate coverage with various transmitter sites, power levels, antenna heights and antenna gain. While the coverage tool is based on the well proven Longley Rice modelling techniques, and publicly available SRTM terrain data, it cannot be guaranteed and Nautel cannot assume any liability for the results. Further, the coverage tool is not meant to be a replacement for coverage studies and other work done by professional consulting engineers. Please consult with a qualified engineer before applying for your license or ordering your equipment.



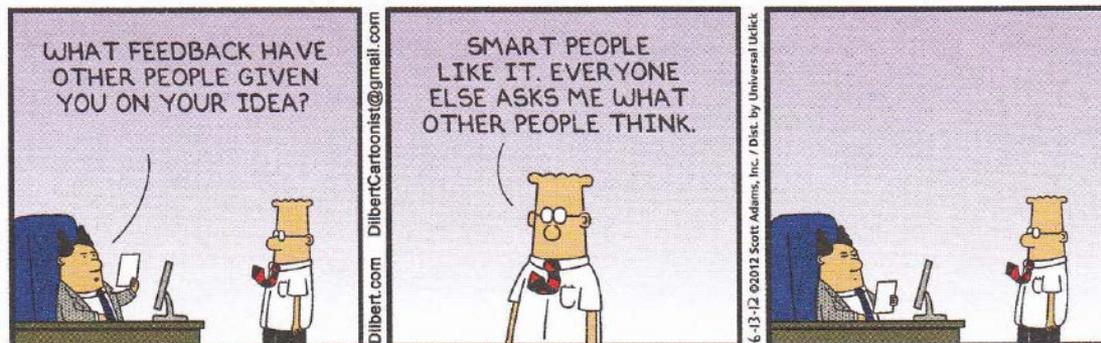
Convergence

Mind Experiment

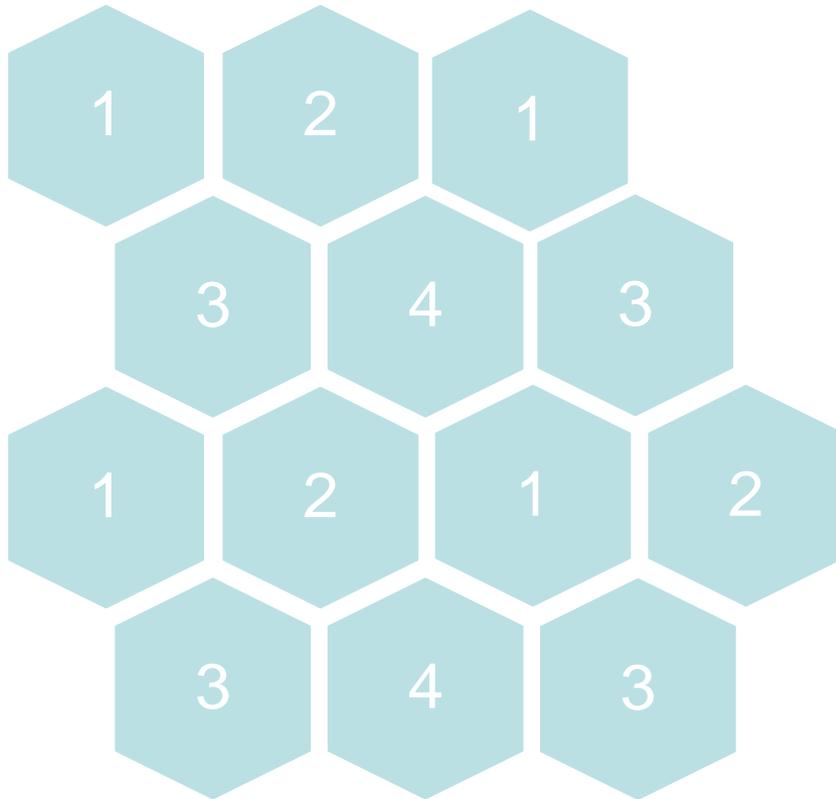
Greenfield Mind Experiment

Technology is About the Past

- Where We Are At:
 - AM Needs “Revitalization”
 - TV Needs ATSC 3.0 “Reinvention”
 - TV Needs “Repacking”
 - FM needs to get on Smart Phones
- So What if?



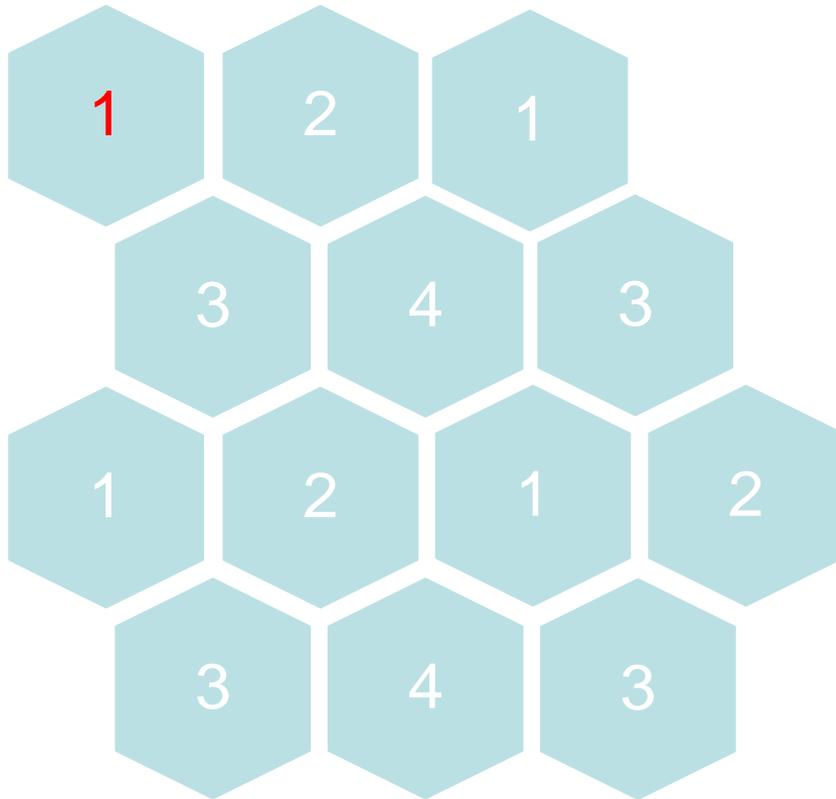
“Cellular” Band Plan



Block	Frequency
1	471-521
2	521-571
3	571-621
4	621-671

Four 50 MHz Blocks
Channel 14-47

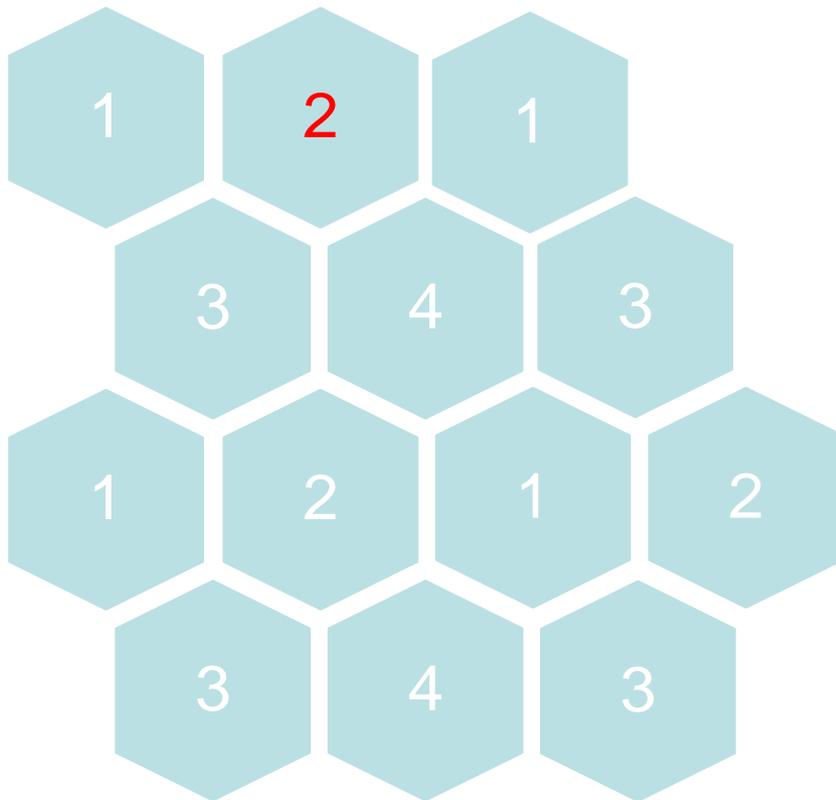
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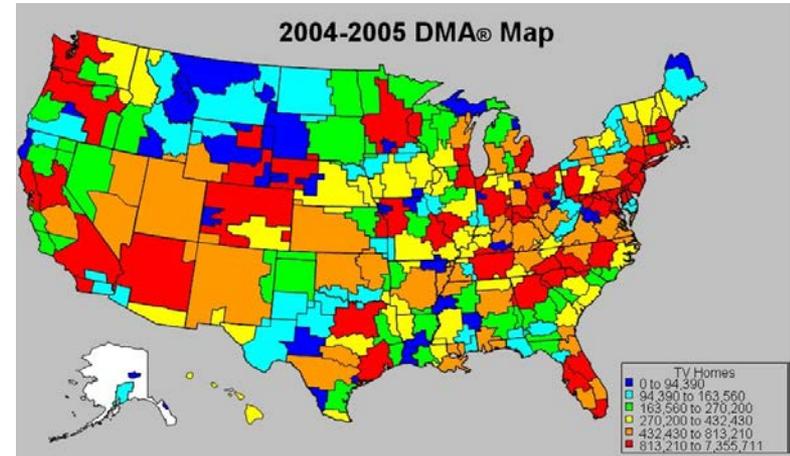
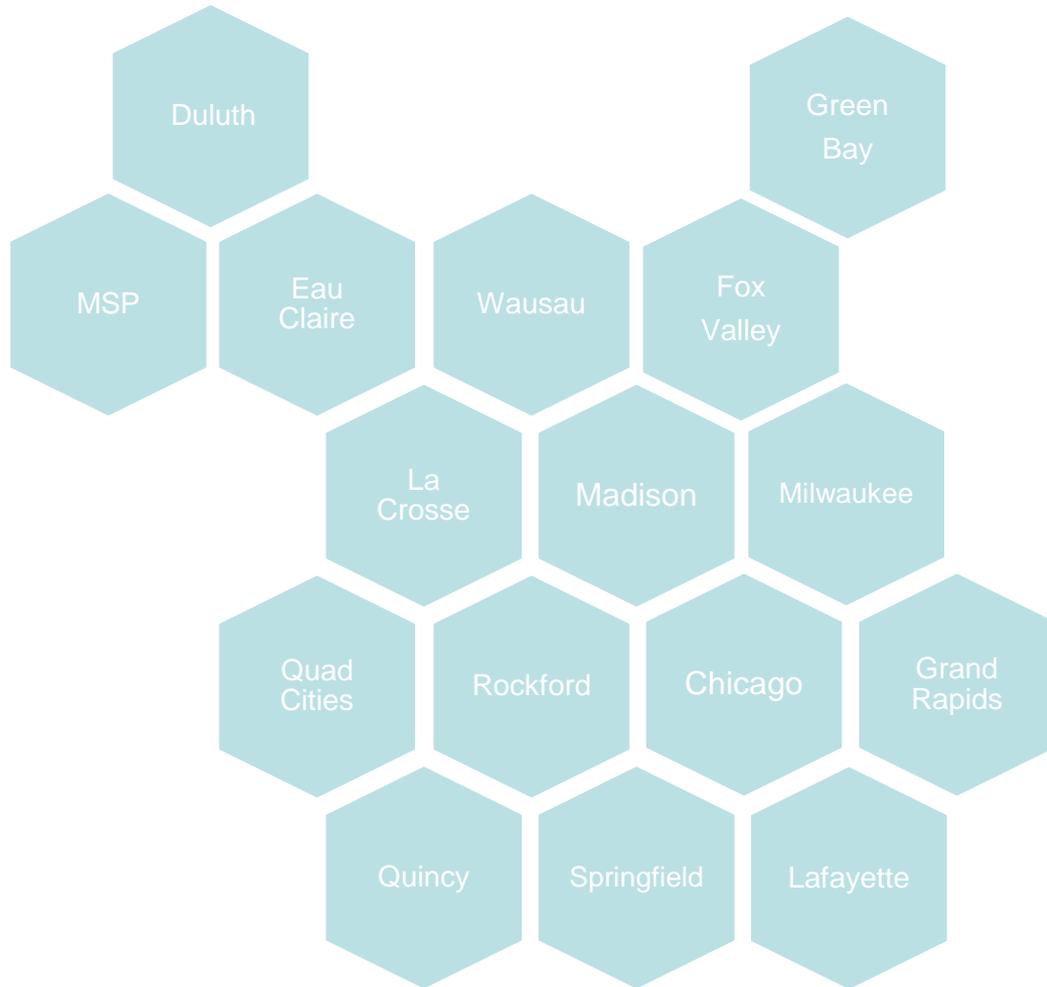
“Cellular” Band Plan



Block	Frequency
1	471-521
2	521-571
3	571-621
4	621-671

Four 50 MHz Blocks
Channel 14-47

“Cellular” Band Plan



“Cellular” Band Plan



200 MHz is divided up into:

50 MHz for Broadcast

150 MHz for Wireless

In Each Cell

50 MHz

- 75 Mb/s BW for *all* of broadcasting
 - 2 bits/Hz Payload
 - Heavy Error Correction
 - (In ATSC 1.0 this is 3.8 CH's ~ 15 Services)

50 MHz

- 75 Mb/s BW for all of broadcasting
- HEVC
 - Radio 0.039 & 0.016 Mb/s $X250=9.75$

50 MHz

- 75 Mb/s BW for all of broadcasting
- HEVC
 - Radio 0.039 & 0.016 Mb/s $X250=9.75$
 - QVGA 0.275 Mb/s $X50= 12.25$

50 MHz

- 75 Mb/s BW for all of broadcasting
- HEVC
 - Radio 0.039 & 0.016 Mb/s $X250=9.75$
 - QVGA 0.275 Mb/s $X50= 12.25$
 - SD 0.600 Mb/s $X20= 12$

50 MHz

- 75 Mb/s BW for all of broadcasting

- HEVC

- Radio 0.039 & 0.016 Mb/s

X250=9.75

- QVGA 0.275 Mb/s

X50= 12.25

- SD 0.600 Mb/s

X20= 12

- EAS, EPG, Data

4

50 Mb/s

50 MHz

- 25 Mb/s of “leftovers”
 - 10 Mb/s
 - Big Time EAS
 - 4-5 Public/Educational TV
 - 10-20 Public/Educational Radio

50 MHz

- 15 Mb/s of “leftovers”
 - 4K – At least for special events
 - Time Redundancy for Radio
 - Better Fidelity (Dolby Atmos AC-4)
 - More Services
 - More Robust Transmission
 - Non Commercial / Non Educational / Non Public

DAS



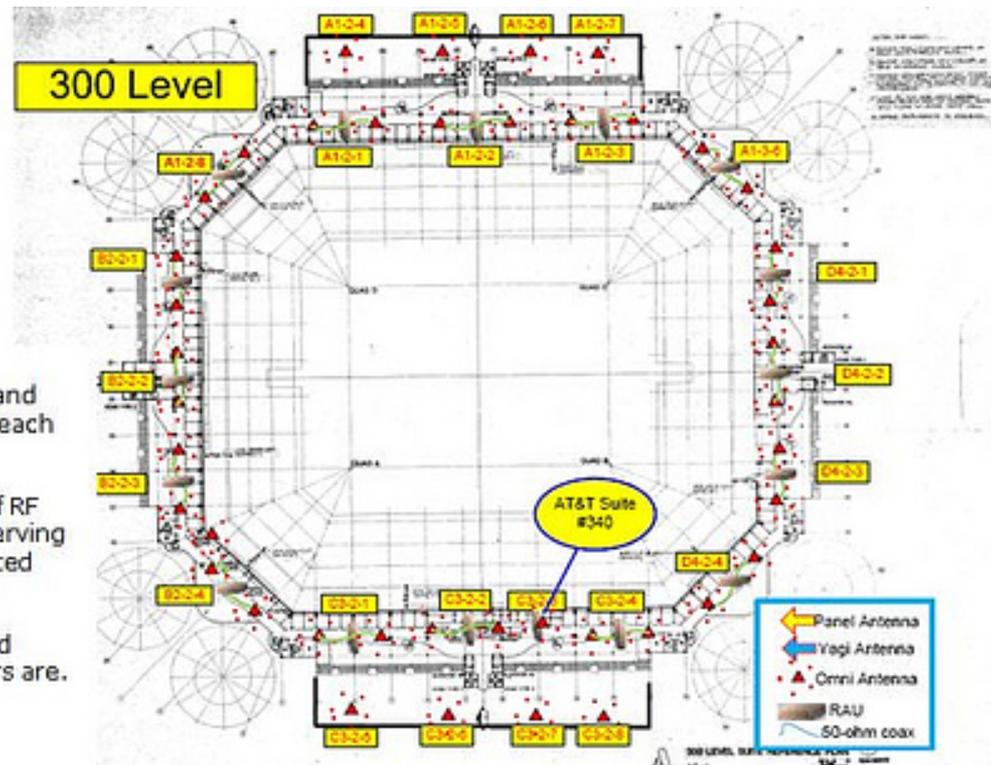
DAS



DAS

RAU Locations

- Provide coverage and capacity in hard to reach locations.
- Allow for control of RF signal so multiple serving sectors can be created within the stadium.
- Place coverage and capacity where users are.



Greenfield Mind Experiment

Technology is About the Past

- Things we Lose
 - Everyone has same coverage
 - No have and have nots
 - Tough on LP, community, rural, neighborhood
 - No Guard Bands or Taboo
 - Multiple Big Towers
 - Individual EAS

Greenfield Mind Experiment

Technology is About the Past

- Why its not ridiculous
 - \$ from Spectrum Sales
 - Transmission Consortiums
 - Bigger bang for \$ than now
 - Formulae for granting BW rights
 - Trade/Sell those rights
 - Plays Nice with Wireless
 - Very Limited Interference
 - SFNs have fewer overheated RF spots

Greenfield Mind Experiment

Technology is About the Past

- Why it's ridiculous
 - Just one tower (two with redundancy)
 - Technical Cooperation
 - Breaks from the course of history
 - Better Coverage not Better Quality or More Services
 - Not about LR TVs

Convergence

Why it's the Best of Times

Why Broadcast Wins

- Broadcast Station Components
 - Slice of Limited Spectrum
 - Local Content
 - Sales Organization
- Powerful engine for the next generation



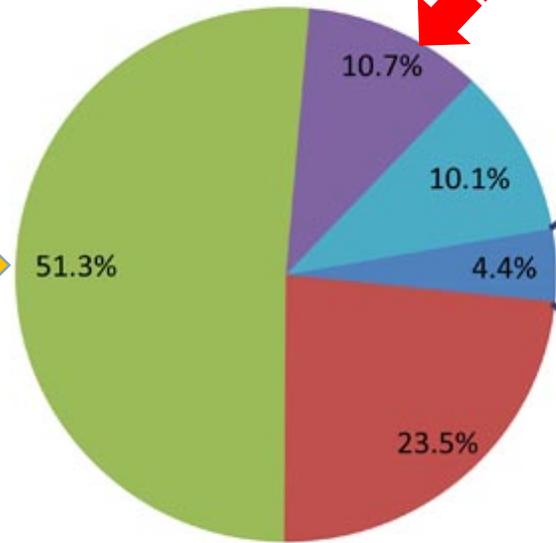
Why Broadcast Wins

- The Pony Express is the only Communication System ever Retired
- The Golden Age of Radio was after TV
- The Golden Age of TV is Now

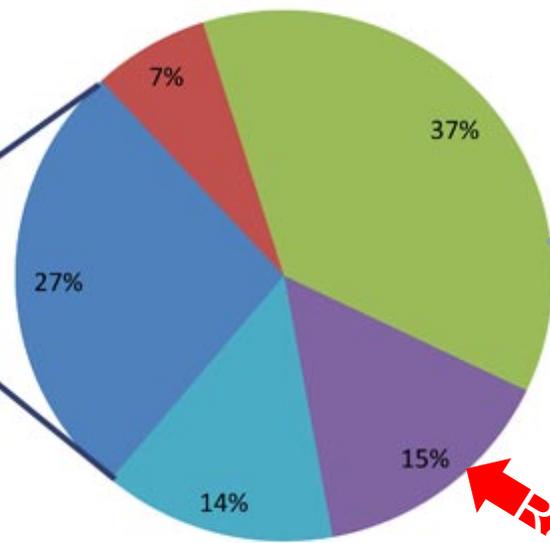


Why Broadcast Wins

Ad Spend



Time Spent per Week



■ Out of Home ■ Print ■ TV ■ Radio ■ Internet

Why Broadcast Wins

average cost to reach 1000 viewers



Why Broadcast Wins

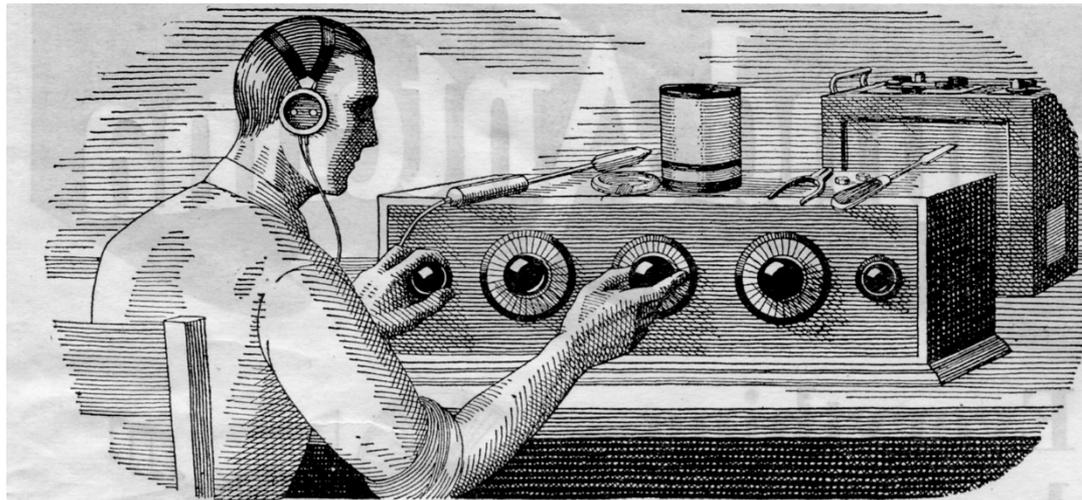
That Said...
That little Red
Internet Stripe is a Tsunami



Convergence

About People Like Us

What About Us?



If all the Radio set I've "fooled" with in my time were piled on top of each other, they'd reach about halfway to Mars. The trouble with me was that I thought I knew so much about Radio that I really didn't know the first thing. I thought Radio was a plaything —that was all I could see in it for me.

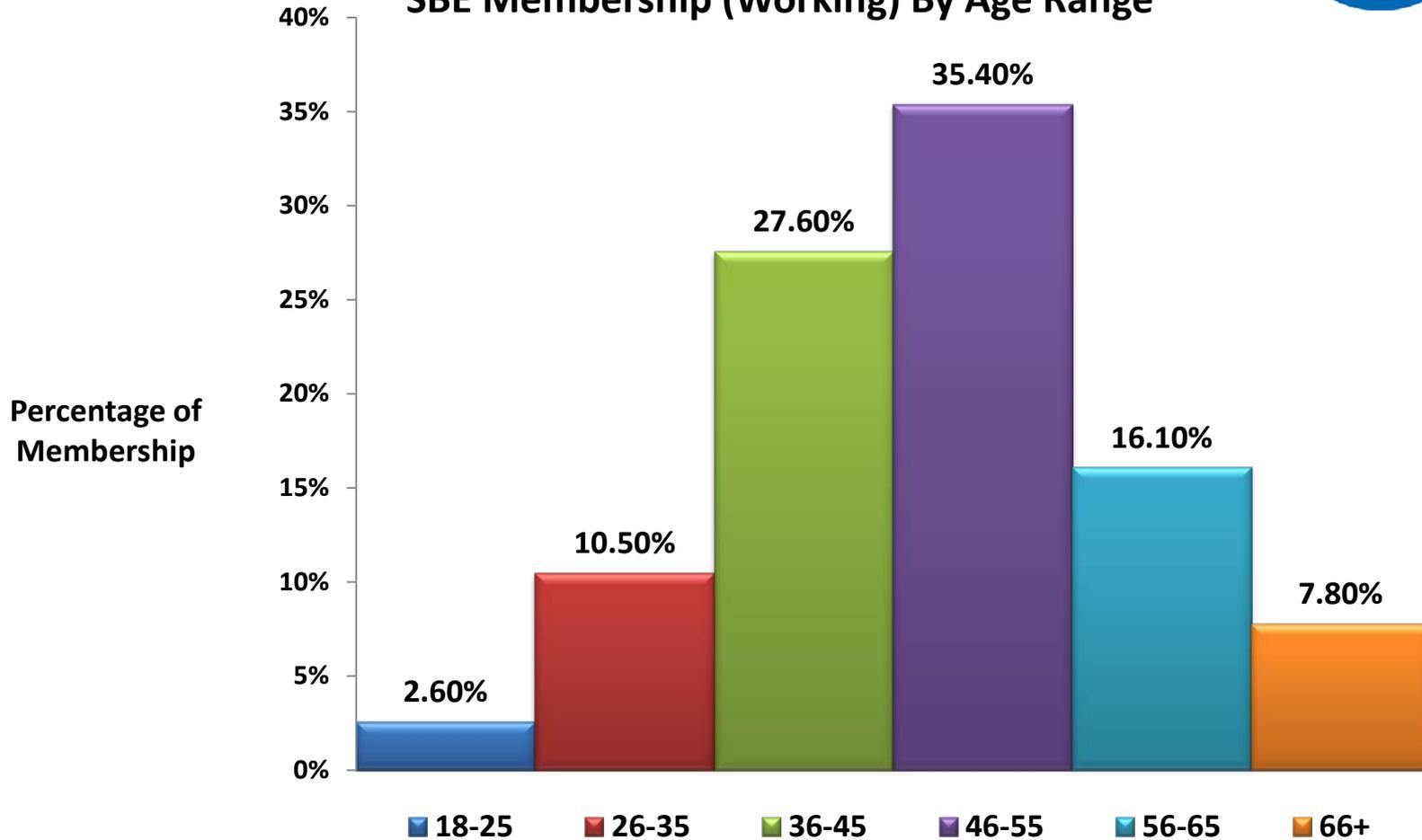
I Thought Radio Was a Plaything

But Now My Eyes Are Opened, And I'm Making Over \$100 a Week!

Aging Demographic



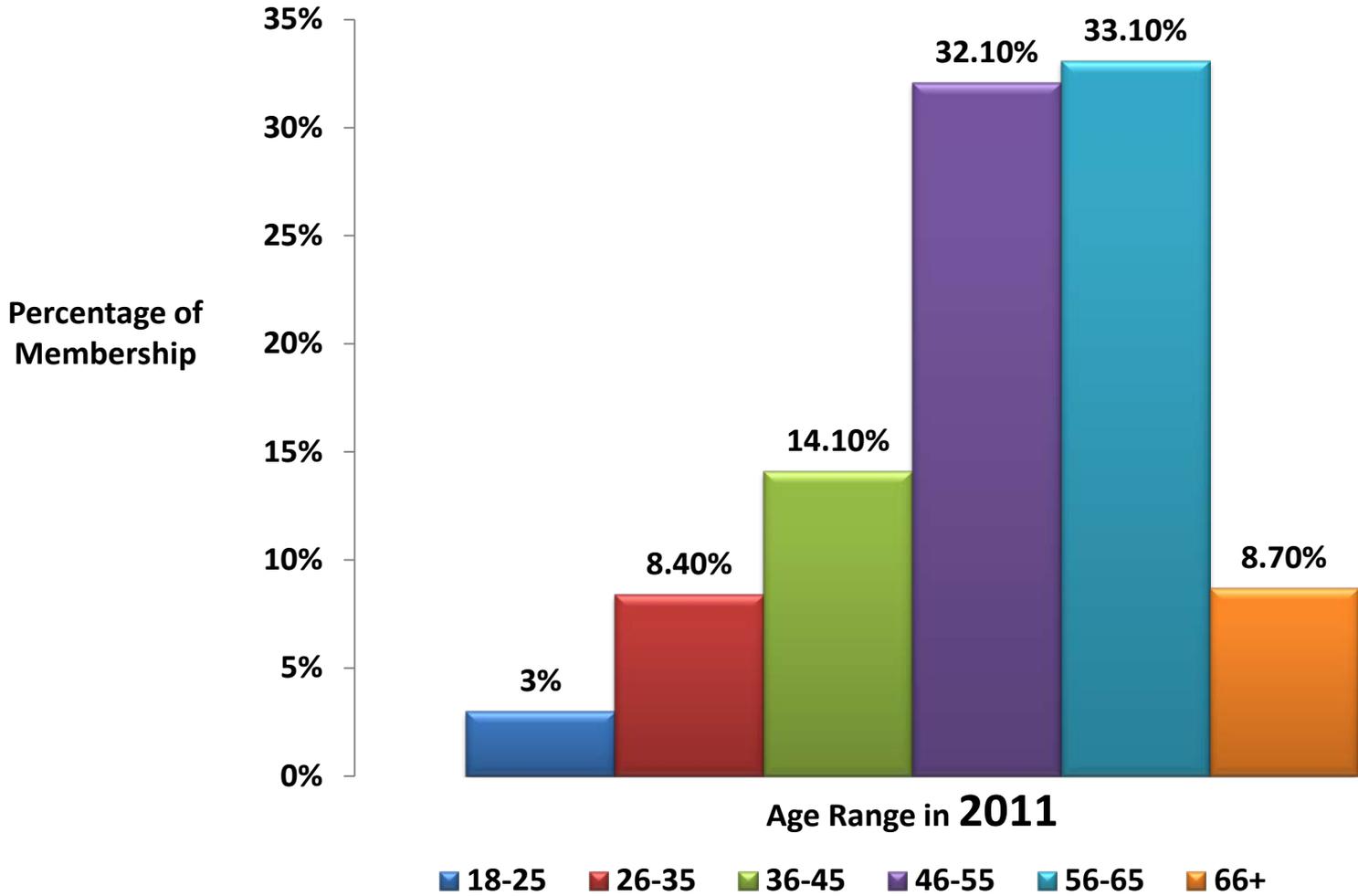
SBE Membership (Working) By Age Range



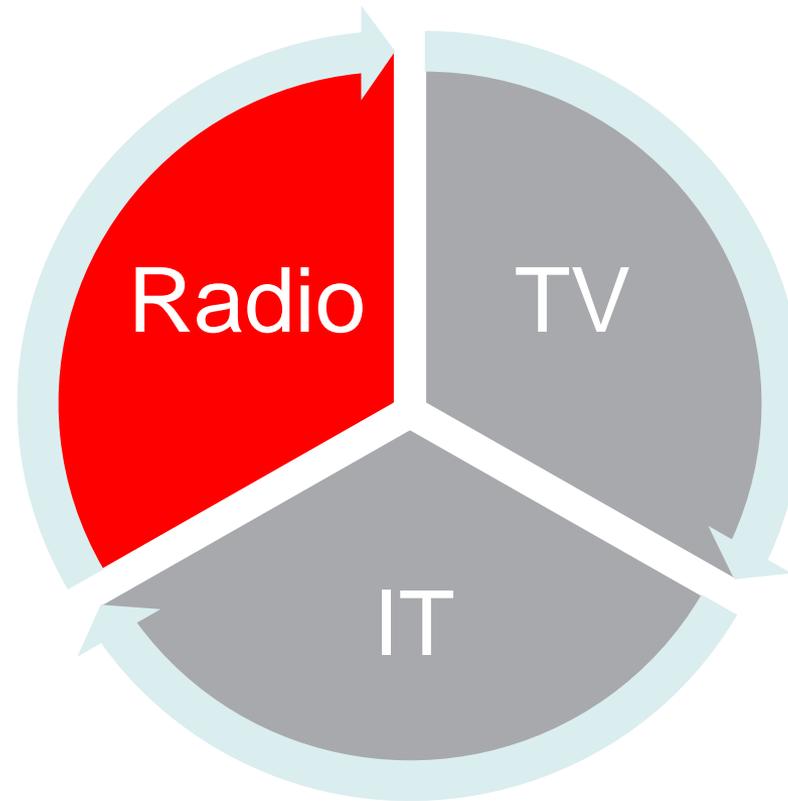
Age Range in **2001**



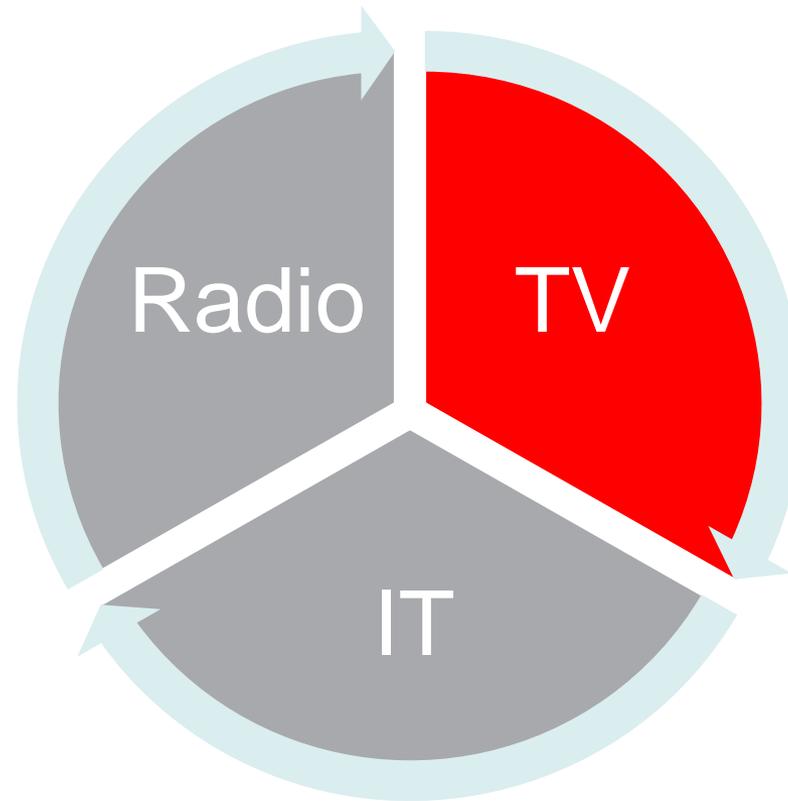
SBE Membership (Working) By Age Range



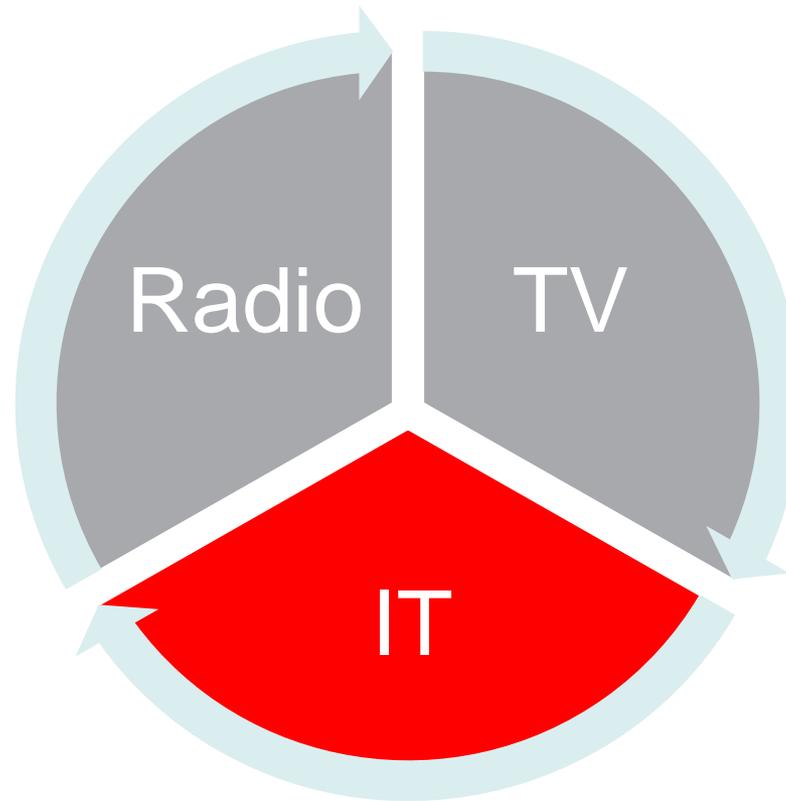
What About Us?



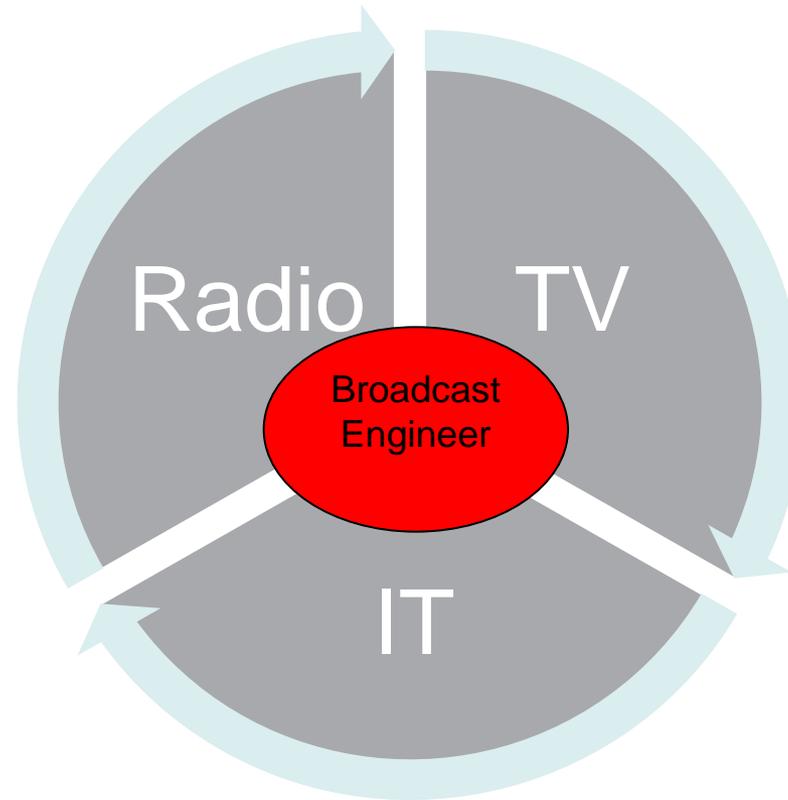
What About Us?



What About Us?



What About Us?



What Broadcast Engineers Do Traditional

- Fix Things
- Manage People Who Fix Things
- Know Things
- Manage \$ to Fix Things
- Sit in Meetings
- Keep Crank Handle on \$ Machine
- FCC & Safety Compliance



What Broadcast Engineers Do Physical

- Building
- AV
- Transmission
- Network, Phones
- Streaming
- Origination
- Safety Compliance



What Broadcast Engineers Do Technologically

- New Stuff
 - Drones
 - Devices (iPhones)
- Automation
- Work Flow
- CDN



What Broadcast Engineers Do Leadership

- Into the future...



FRED CROUTON DISCOVERS WHY THE RESOLUTION ON HIS LAND BASED RADIO IS SO MUCH BETTER THAN THE STREAMED STUFF ON THE NET.



What's not Going to Change?

- Lousy Hours
- Poor Pay
- On Call
- Working with “Creatives”
- Show Business

TRYING BERLIN'S
There's No Business
Like Show Business

Which is of course is all Glamorous



Advice

- Get passed IP 101 it's not about the Physical Layer or the Protocol...
- Don't worry about the next generation of engineers...
- Embrace the Opportunity more than the history...

Bottom Line

- You are not a TV *or* Radio *or* any kind of Medium or Technology Engineer... You are a Broadcast Engineer

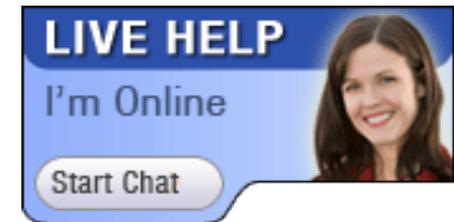
Sometimes the thing that is holding you back...



...is all in your head.

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<http://www.youtube.com/user/NautelLtd>
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<http://store.nautel.com/>





“EVERYONE YOU
WILL EVER MEET
KNOWS SOMETHING
YOU DON'T.”

BILL NYE

Questions? We're ready to help.

Chuck Kelly	Director of Sales
Wendell Lonergan	Head of Broadcast Sales & Europe / Russia
Gary Manteuffel	US Corporate Accts & Canada
Ellis Terry	Western US
Jeff Welton	Central US
Gary Liebisch	Eastern US
Ken Ruzicka	Sales Engineer
John Abdnour	Asia / Pacific
Gerardo Vargas	Latin America / Caribbean
John Macdonald	Middle East / Africa
Christy White	VS and LPFM Specialist



Nautel: www.nautel.com

Email: sales@nautel.com

ENCO: www.enco.com

Email: sales@enco.com



Thank You



Thailand's Engineering Expo 2014, November 29th 2014

DVB-T2 | T2 Lite for digital radio & TV



PLUG IN TO YOUR ANDROID VIA USB
WATCH FREE-TO-AIR DIGITAL TV
LISTEN TO DIGITAL RADIO
NO MOBILE SERVICE NEEDED
BUILT-IN ANTENNA
DVB-T2 & T2 LITE

DIGITAL TV & RADIO
Anywhere