

Elenos Group World Broadcast

WEBINAR:
ATSC3.0 ... The Big Picture



Webinar Schedule

- The Million Dollar Question
- What could ATSC3.0 bring to Broadcasting?
- ATSC3.0 technical summary
- What will I need to change?
- About ATSC3.0
- BE-TV
- Your questions



Your host:
Chuck Kelly
VP Market Development



Special Guest:
Perry Priestley
COO / CSO Broadcast Electronics



Remember, watching this webinar qualifies for ½ credit towards SBE certification under Category 1.

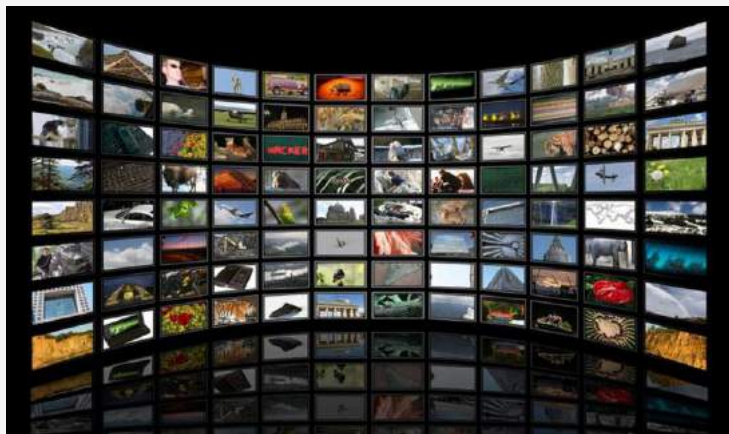


The Million Dollar Question



How will consumers watch TV and video and content in the future?

With so many choices there are four likely scenarios that exist.



1. Total confusion, too many options, too much variety no clear winner, TV survives, but all services have a very small slice of the pie.
2. The “Universal Superstore” wins. Global digital platform companies take over aggregation and distribution from national broadcasters, and OTA broadcasting as we know it disappears.
3. Content is King! Content owners themselves bypass TV OTA via globally available platforms and make OTA broadcasters obsolete
4. ATSC3.0 makes a difference, TV survives, a digital transformation takes place and TV OTA returns to its original strong market position



Will ATSC3.0 change anything?



- Certainly initially, ATSC1.0 did not change viewing habits or potential business opportunities and thus did not have much affect on revenue. More channels per 6 MHz. It took almost 10 years for additional channels to have an effect revenue
- ATSC3.0 TV could change television, as much as POTS telephones were changed by wireless and then wireless by the internet.
- Once adopted, every department in every TV station and the viewer's watching habits will become as outdated as VHS tapes, slide projectors and 8 track!

What changes could ATSC3.0 bring to Broadcasting?



- Targeted Advertising - Channel watermarking allows targeting capabilities, and the IP return path enables the ability to measure audience activity
- Targeted Content - ATSC3.0 “targeting” ability also allows broadcasters to better reach narrow audiences with niche content that can increase value for advertisers.
- Subscription Services - New ways to support conditional access for “freemium,” onetime, and premium services.
- More Channels - Efficient video and audio compression will significantly boost effective bandwidth, by a factor of 3 or more.

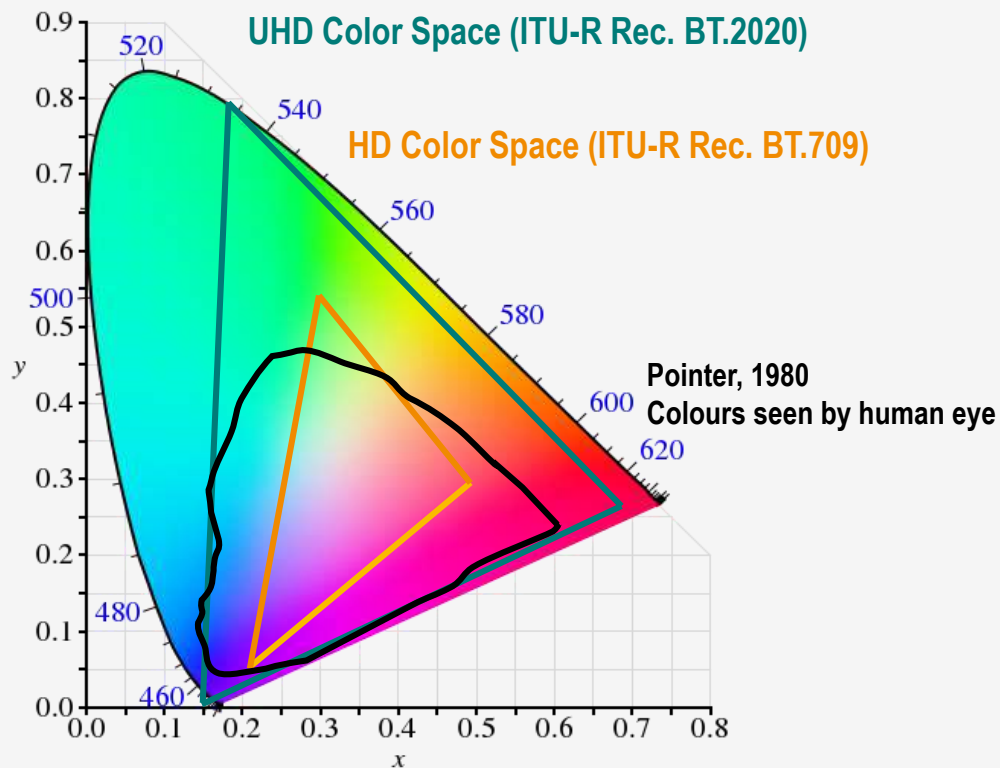
What more could this change bring to Broadcasting?



- Mobile Services - Seamless delivery of programs and data services will be specifically targeted to portable and mobile devices.
- Greater Capacity - A system can support a third-party “offloading” business where data, video and other bandwidth-intensive content (such as software updates for devices) can be transmitted over broadcast networks for “edge” storage or delivery to non-household destinations.
- Second Screen - The ability to deliver program related second-screen content by either Over the Air (OTA), or OTT distribution.
- Interactive content - using the IP return channel.



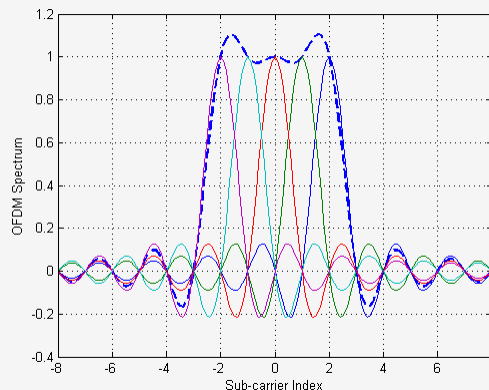
ATSC3.0 Technical Summary: Picture and Sound Quality....



- Ultra High Definition or 4K (3840 x 2160) 8.3MPixels
- High Dynamic Range (HDR) and Wide Color Gamut
- Frame Rates are up to 120fps (Blu-Ray is 24fps)
- Immersive audio experience (5.1, 7.1, 7.1.2 etc.)



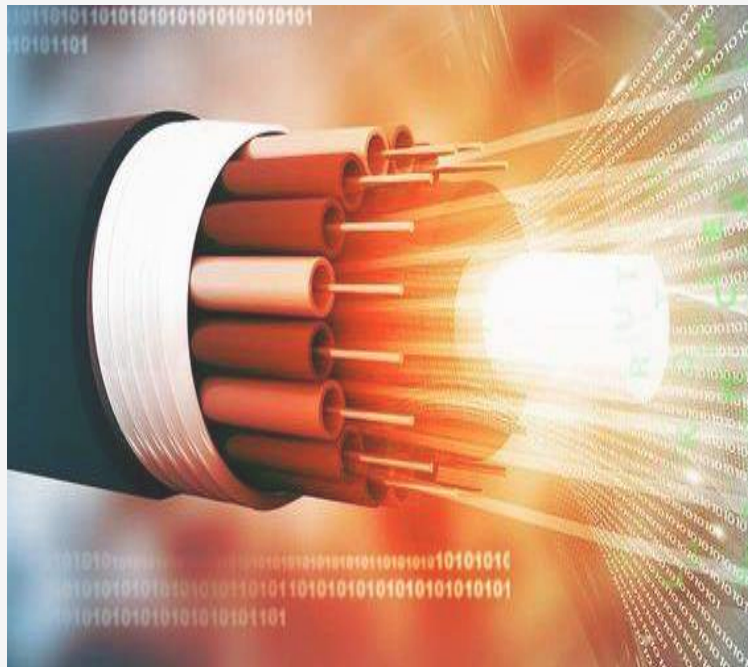
ATSC3.0 Technical Summary: OFDM



- OFDM The big difference.
- ATSC1.0 is a single carrier system
- Used in DAB, DRM, HD Radio®, WiFi standards like 802.11 etc., LTE, LTE-A, every digital TV standard in the world.... DVB-T,T2, ISDB-T, DMT, and CMMB... but NOT ATSC...?
- Better reception
 - Immunity to selective fading
 - Resilience to interference
 - Spectrum efficiency
 - Simple channel equalization
- Mobility – Portability....

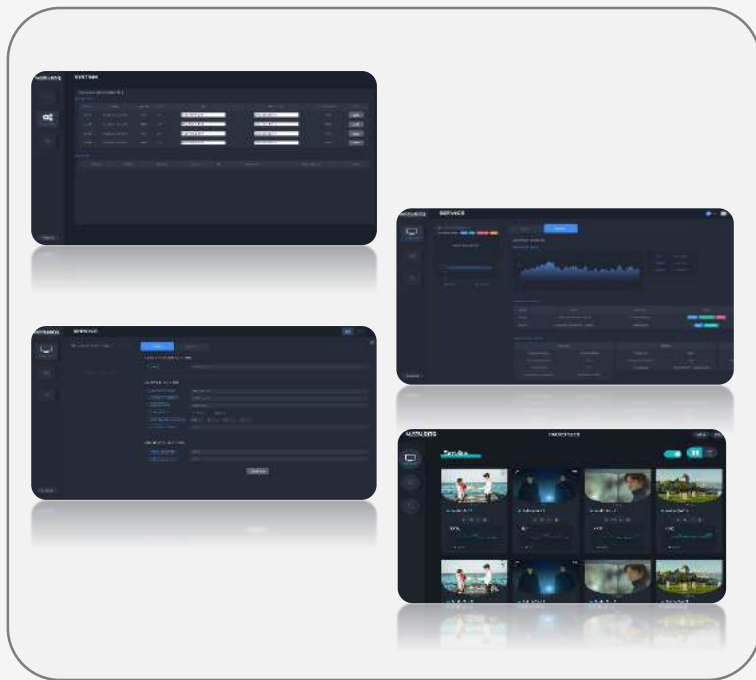


ATSC3.0 Technical Summary: Physical Layer Pipes



- Variables (literally thousands) that determine robustness and payload capacity
- Modulation scheme; QPSK, 16QAM, 64QAM, 256QAM, 1024QAM and 4096 QAM.
- Non-Uniform / Uniform constellations
- Three basic modes of multiplexing ; Time - Layered - Frequency
- Low-Density Parity Check (LDPC) Forward Error Correction codes ; 2 code lengths and 12 code rates defined
- Also.. Guard intervals, Frame types, scattered, pilot patterns and FFT's.

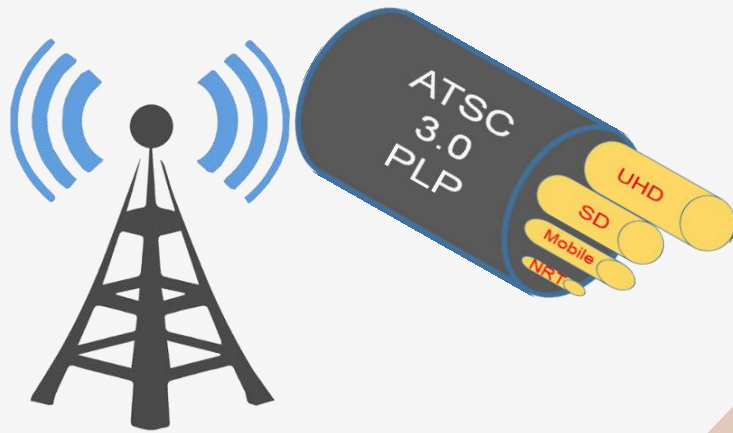
ATSC3.0 Technical Summary: Scheduler and Gateway



- The good news all of this will be automated in what is called the Gateway *
- The Gateway will do all the
 - Service Scheduling; PLP manipulation
 - ATSC 3.0 set up
 - Bootstrap
 - Pre-amble
 - Information insertion

* Equivalent to ATSC's Multiplexer and PSIP generator

ATSC3.0 Technical Summary: PLP's



PLP 1 Rooftop Antenna
UHDTV

PLP 2 Indoor Antenna HDTV

PLP 3 Mobile, Smart Phone,
Radio, Portable.....



PLP 4 Set Top Box (STP)
for NRT

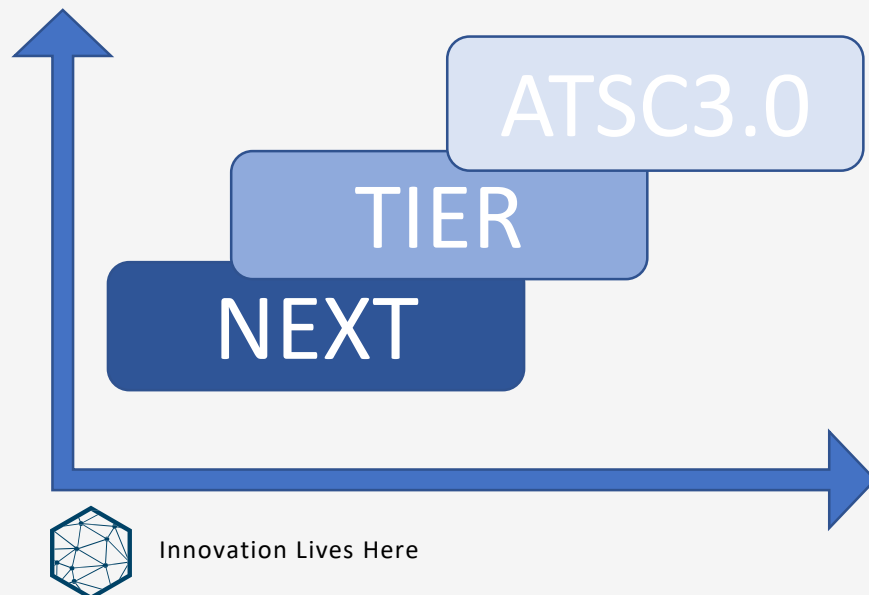


How much will I
need to spend at a
minimum, and
when, and what is
my return on that
investment?



- As with most equipment purchases; the return is proportional to the investment.
- The biggest deciding factor for when; is receivers. No receivers, no viewers.
- Receivers and home gateways are available now, but realistically 2021.
- It is not a chicken and egg situation. Typically 8 or less stations serve 100's of thousands of households. Stations must move first.
- \$20,000 for a very basic ATSC1.0 duplication system
- As much as \$150,000 for a comprehensive system with 4K encoders and multiple channels and features.

If I add more investment, what's the next tier, what does it cost, when would it be spent, and what would be the marginal return?



- There is the option to begin with a gateway simulator, a small investment that will allow ATSC3.0 transmission but only a replication of the ATSC1.0 stream. Not a strong commercial value but will allow you to determine market penetration as well as figure out PLP variations and options.
- Moving to 4k will also potentially not attract more viewers, but equally it might stop viewers moving to other platforms.
- Adding NRT features (with the appropriate receivers available) will also offer potential financial returns
- Focusing on low bit rate high FEC and targeting mobile devices could dramatically increase revenue, again when receivers are available.

Are there changes in how I run my station? Are their new responsibilities?



- From the previous slide we can see that a lot of parts of the studio will change; cameras, UHD production, STL and almost everything operating in the IP domain.
- A knowledge of ROUTE and MMT IP technology will be required
- Selecting the type and quantity of PLP's and changing these daily or even hourly will be a significant responsibility, with real consequences if wrong
- A whole different set up, management & monitoring system will be required to ensure QoS as well as OSS/BSS



It seems I've been investing a lot of money in Digital TV. Will this be it for awhile?

- With every new technology there will be changes and challenges, but just like so many new inventions came results that we never thought possible.
 - The light bulb; scorned when first shown. Ridiculed by the British Science world!
 - Alternating Current (AC); Westinghouse said no one would ever use it
 - Telephone; Hardly more than a toy "Western Union"and most recently
 - From 3G came UBER®/Lyft®
 - Yes.. Investments will be for a while... but it will be worth it.

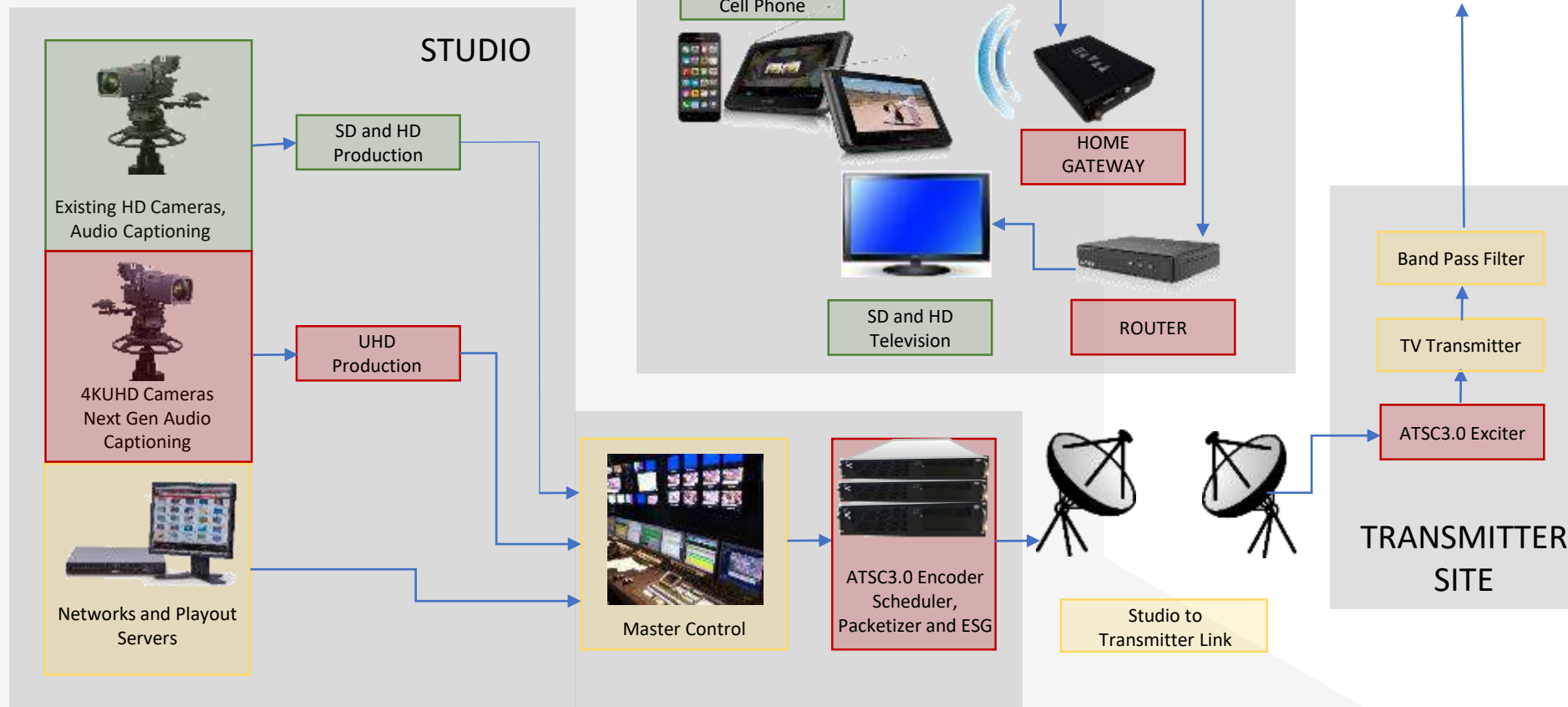


What will I need to change?

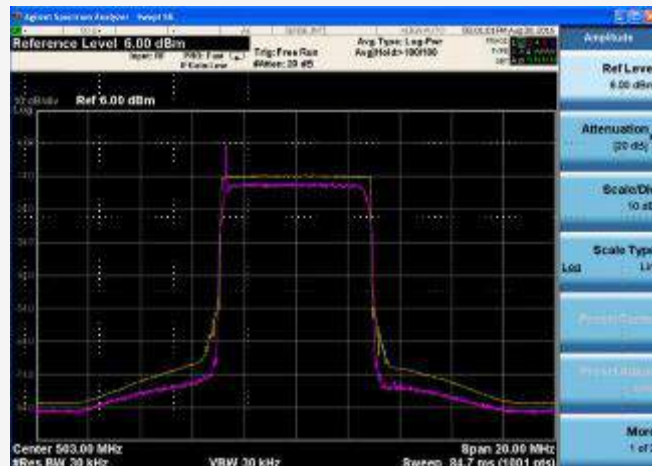
May Need Upgrade

NEW

Existing – No Change



What will I need to change?



MER, dB		47.6
Shoulder Attenuation, dB		
Left	62.4	Right 62.7
Shift, Hz	-70.1	

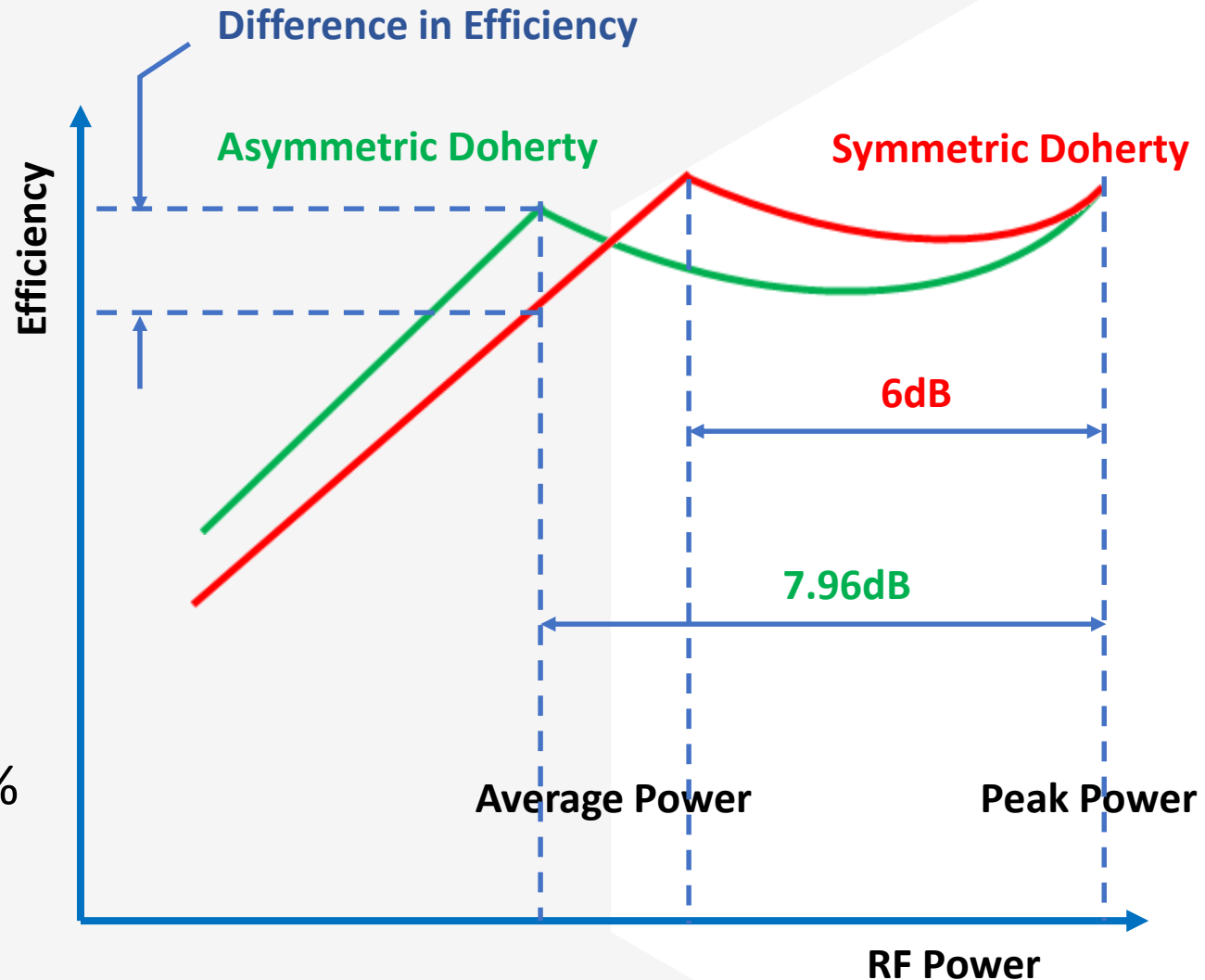
- Most DTV excitors will not be upgradable to ATSC 3.0 and will have to be replaced
- When replacing items to consider
 - Mechanical size and fit
 - Electrical power requirements
 - Cooling
 - RF output level
 - Inputs
 - Adaptive correction samples and levels
 - Connector sizes etc.
 - Control/monitoring interfaces

What will I need to change?

- Both IOT or older style Class A/B solid state transmitters may not have the ability to reach the new peak-to-average ratio requirement.
- With a higher peak to average ratio the older style solid state transmitters will be significantly reduced in efficiency; as low as 15% Whereas modern Doherty Transmitters can exceed 50%.
- Out of band spurious emissions may not meet specifications: additional filtering or improved correction (from exciter) may be necessary



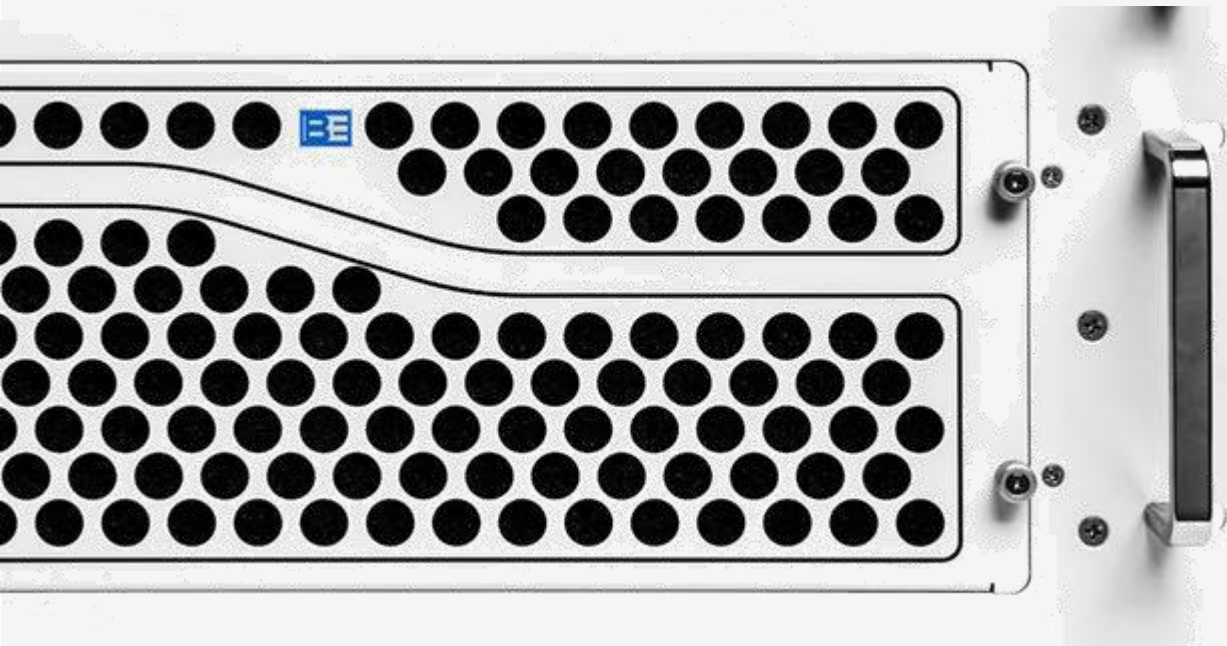
- Even newer Doherty transmitters delivered within the last 5-6 years may not provide the best efficiency
- Asymmetrical Doherty LDMOS Characteristics
- BLF-888E shown in example
- Voltage = 50V,
- Average power = 150W
- Efficiency at pallet ~ 52%
- Gain ~ 17dB
- Frequency range 14-36 (US repacked spectrum)



Asymmetric vs. Symmetric Doherty

What will I need to change? The Home Gateway





BE-TV

A new series of high performance, high efficiency television transmitters

Powers from 2 watts to 60kW

Air or Liquid Cooled

UHF / VHF

All Television Standards

All supported by BE in Quincy, IL



Summary

- If broadcasters do not change, they will become insignificant or worse-still obsolete
- ATSC3.0 will change everything from how studios work to viewing methods, and everything in-between
- ATSC3.0 offers viewers more choices, alternative viewing methods and better-quality video and audio
- ATSC3.0 offers enormous opportunities for all OTA segments: LPTV, Class A and Full-service stations
- Most existing transmitters will work with ATSC3.0 but upgrades or a replacement maybe necessary to get the best performance and efficiency
- Studio facilities require large investment, but there are options to begin on a small scale
- A Home Gateway type device is the path to quick viewer adoption



Your Questions?

*We'll try to answer them all here, but if we
can't we'll email you.*



Thank You



Radio & Television Broadcast Equipment and Solutions Worldwide

Elenos Group | Transmitters and Service Solutions |

Contacts:

North America: Perry Priestley
p.priestley@elenosgroup.com

Latin America: Ricardo Jimenez
r.jimenez@elenosgroup.com

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