

# New Life for AM with Digital Transmission

## A Look at the Options

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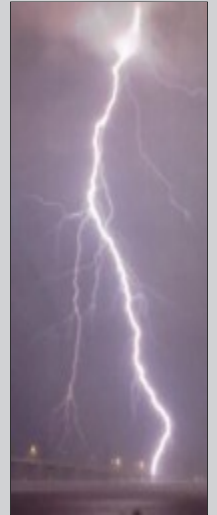


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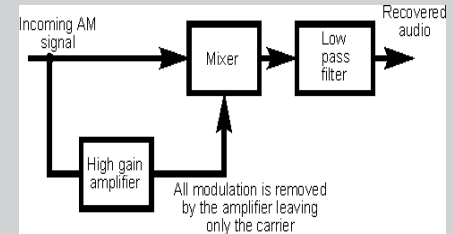
# Why the Erosion of AM?

- Quality of signal
  - Noise
    - Atmospheric static
    - Man made noise
    - Receiver bandwidth reduced to combat noise
      - Results in worse frequency response, now  $\leq 4$  kHz
      - Cost reductions in receivers further compromise quality



# Man-Made Hindrances

- Failure to implement technology
  - Synchronous detectors
  - Noise blanking
  - Variable bandwidth by reception conditions
  - NRSC-1-B response not adopted in receivers (AMAX)
  - Lack of wide-spread adoption of AM Stereo
    - Even after receivers entered the marketplace



# Further Diminution of AM



AM stations being donated to non-profits

- Radio World cites 7 donations including a Detroit AM

FM simulcasts of large AM news/talk stations

- WSB Atlanta, WTOP Washington, WFAN NY, WBBM Chicago etc.



Mexico & Canada migrating AM's to FM wherever possible

- Nautel's home city Halifax (400,000+) now has no AM services

Many European nations turning off many/all AM



# What Can We Do About It?

- Digitalization
  - It's not just about sound quality (but partly it is)
    - Rich media experience is what consumers demand today
    - Interactivity (Smart Phone is great for this)
    - “Cool” features
      - Graphics displays
      - More information



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# The Platforms



- Two Major AM Digital Platforms
  - HD Radio™ Technology
    - Developed in US by iBiquity Digital Corp
    - Has ITU recommendation
    - Deployed in US on 250+ AM stations
      - Mostly the largest, high power stations in big cities
    - Licensing of stations by iBiquity required (in US)



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# The Platforms



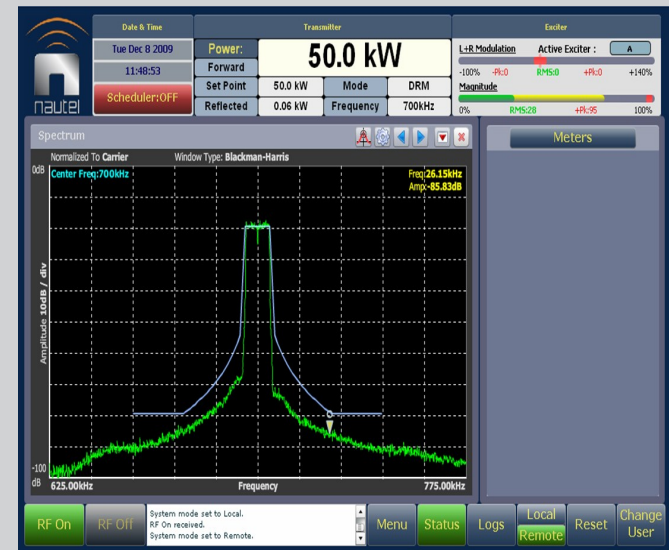
- Two Major AM Digital Platforms
  - Digital Radio Mondiale (DRM)
    - Developed primarily in Europe
    - Has ITU recommendation
    - Deployed globally primarily on SW & MW ~ 30 active sites
    - No broadcast station licensing by DRM





# More About the Systems

- Both systems have similar tx requirements
  - Tx must be linear or pre-corrected to linear
    - Mask compliance is required or interference results
    - Most modern AM tx capable of either system

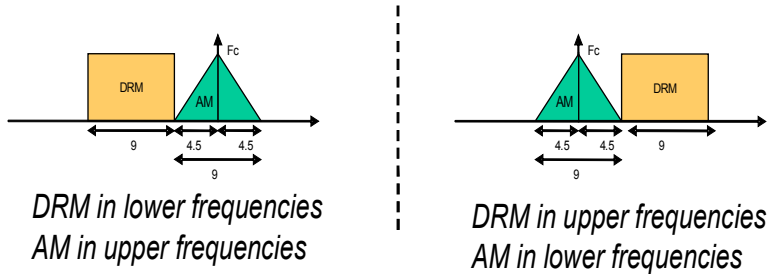




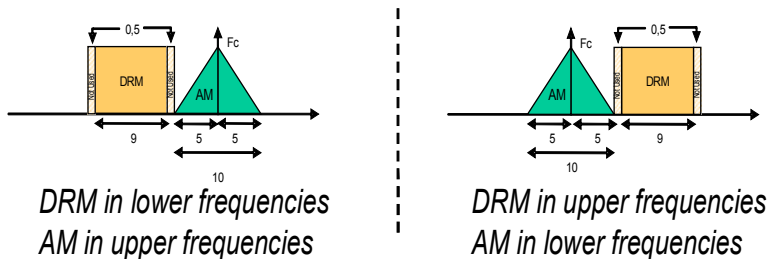
# More About the Systems

## Simulcast Principles

### ❖ DRM Simulcast using a 18kHz Bandwidth

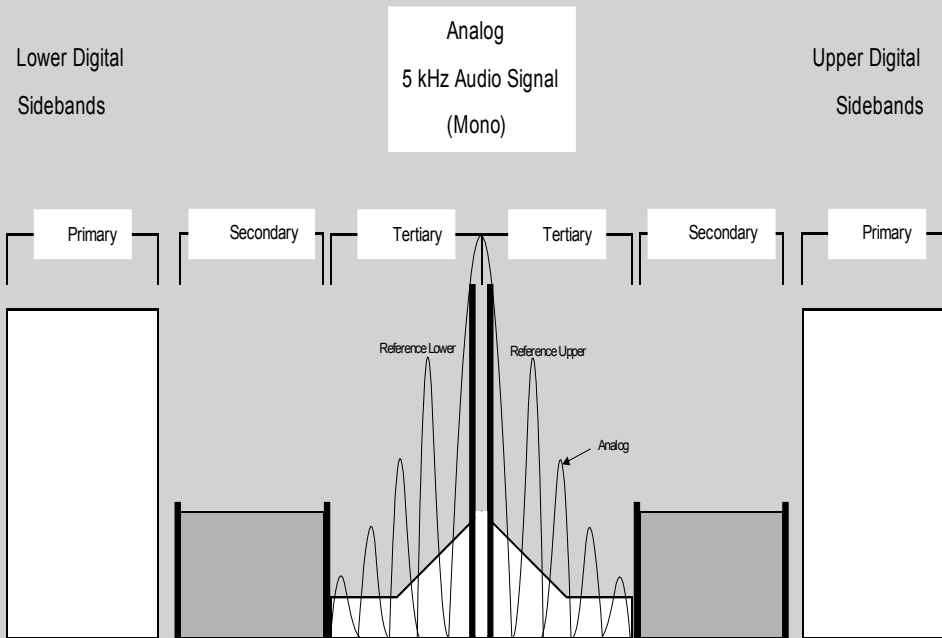


### ❖ DRM Simulcast using a 20kHz Bandwidth

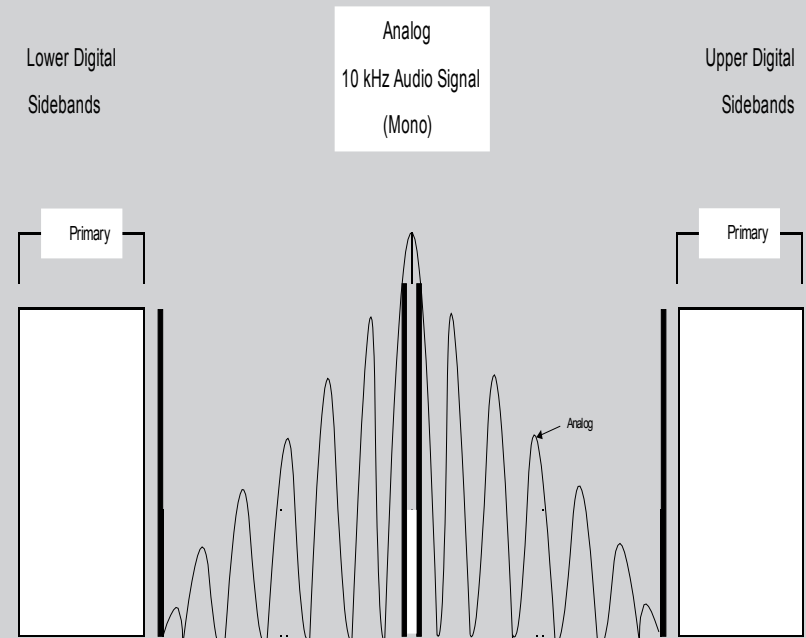


- DRM Simulcast modes for both 9/10 kHz
- Note that “double channels” required

# More About the Systems



iBiquity Conventional AM MA1



Modified MA1



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# Bitrates Available



MODE (Total Kb/s)	Kb/s P1	Kb/s P3	Kb/s PIDS
MA1 Full Hybrid Mode (36.8)	20.2	16.2	.4
MA1 Hybrid Reduced Digital b/w Config (20.6)	20.2	N/A	.4
MA3 Full All-Digital (40.8)	20.2	20.2	.4
MA3 All-Digital Reduced Digital b/w Config (20.6)	20.2	N/A	.4

Mode	MSC Modulation (nQAM)	Robustness level	Nominal Signal Bandwidth (kHz)						
			4.5	5	9	10	18	20	100
			Approx. available bit rate kb/s (equal error protection, standard mapping)						
A	64	Min.	14.7	16.7	30.9	34.8	64.3	72.0	
		Max.	9.4	10.6	19.7	22.1	40.9	45.8	
	16	Min.	7.8	8.8	16.4	18.4	34.1	38.2	
		Max.	6.3	7.1	13.1	14.8	27.3	30.5	
B	64	Min.	11.3	13.0	24.1	27.4	49.9	56.1	
		Max.	7.2	8.3	15.3	17.5	31.8	35.8	
	16	Min.	6.0	6.9	12.8	14.6	26.5	29.8	
		Max.	4.8	5.5	10.2	11.6	21.2	23.8	
C	64	Min.				21.6		45.5	
		Max.				13.8		28.9	
	16	Min.				11.5		24.1	
		Max.				9.2		19.3	
D	64	Min.				14.4		30.6	
		Max.				9.1		19.5	
	16	Min.				7.6		16.2	
		Max.				6.1		13.0	
E	16	Min.							186.3
		Max.							99.4
	4	Min.							74.5
		Max.							37.2



**HD Radio®**

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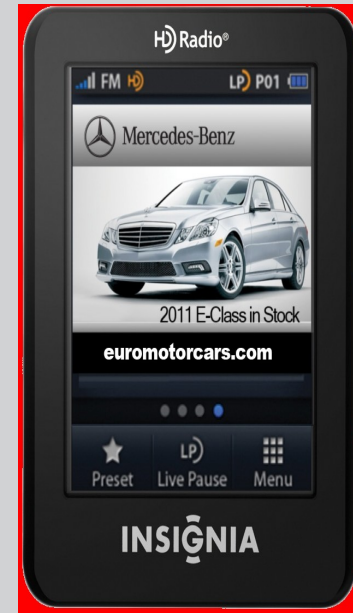


Note – Mode E only  
for DRM+



# Why Hybrid or Simulcast?

- Creates an orderly market transfer to digital
  - Existing receivers continue to operate
  - New receivers add features not available in analog
- The ultimate is to create the all digital mode
  - Improved coverage/lower transmission costs
  - Reduced interference
  - Higher bit rates



# What Listeners Want Today



- The speed of now – the audience has become spoiled/demanding
  - Interactivity
  - Not just audio (but rich media)
  - Content relevant to them and tailored to them
  - Small portable devices (transistor radios are out, and desk top and laptop sales are off, smart phones are skyrocketing)
  - Shorter bits, not long form programming – ideal for quick downloading/streaming



# Why Broadcasting Then?



- Cell data networks are not keeping up with demand (crippled in places)
- Data is not free, and almost nowhere is it unlimited
- Data coverage is not universal especially in more rural areas
  - Network speeds are also not 3G or 4G LTE in more rural areas
  - Spotty coverage is annoying to listeners
- Broadcasting is free over the air and can cover a wide area with MW and LW and at very low transmission costs (10-20% of analog)





# Some Examples



TAG it button to capture purchase token

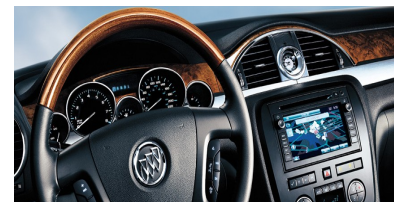


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HD2/HD3



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# Summary

- AM is failing in many parts of the world and needs a boost (digital!)
- Both systems – HD Radio and DRM have technical similarities
- Transmitter requirements are similar, excitors differ
- Both can offer significant wide area digital coverage
- Both offer an array of rich media features desired by consumers
- Both offer an interim hybrid or simulcast mode on path to full digital
- Both offer significantly reduced transmission cost over analog
- Both have demonstrated the core technologies work

# Thank you!



For more information:

[www.ibiquity.com](http://www.ibiquity.com)

[www.drm.org](http://www.drm.org)

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