

# TV Incentive Auction Update

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**AMERICAN TOWER®**



# Incentive Auction

**Reverse Auction: TV stations voluntarily participate to sell spectrum**

**Auction progressively reduces prices until demand is met or stations drop out**

› **Winners** Sell spectrum and:

- › End Operations
- › Channel share with losing station
- › Move to Hi-VHF
- › Move to Lo-VHF

› **Losers** Keep spectrum

- › Remain on current channel
- › Participate in non-voluntary repack below spectrum clearing target
  - › May or may not be safe on channels below target

**Forward Auction: Wireless carriers purchase licenses for 5MHz blocks of uplink and downlink**

**Auction progressively raises prices until bidding stops**



# Current Status

Through 2 stages and on 3<sup>rd</sup> stage of reverse auction

✓ Reverse Auction:

- Stage 1 \$86 B
- Stage 2 \$56 B
- Stage 3 ?? Ongoing

✓ Forward Auction:

- Stage 1 \$23 B
- Stage 2 \$21 B
- Stage 3 ??

144	21	22	23	24	25	26	7	A	B	C	D	E	F	G	H	I	J	3	37	3	K	L	11	A	B	C	D	E	F	G	H	I	J	K	L	700 MHz UL
138	21	22	23	24	25	26	27	11	A	B	C	D	E	F	G	H	3	37	3	I	J	K	11	A	B	C	D	E	F	G	H	I	J	K	700 MHz UL	
126	21	22	23	24	25	26	27	28	29	3	A	B	C	D	E	F	3	37	3	G	H	I	J	11	A	B	C	D	E	F	G	H	I	J	700 MHz UL	
114	21	22	23	24	25	26	27	28	29	30	31	7	A	B	C	D	3	37	3	E	F	G	H	I	11	A	B	C	D	E	F	G	H	I	700 MHz UL	
108	21	22	23	24	25	26	27	28	29	30	31	32	11	A	B	3	37	3	C	D	E	F	G	H	11	A	B	C	D	E	F	G	H	700 MHz UL		
84	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	3	A	B	C	D	E	F	G	11	A	B	C	D	E	F	G	700 MHz UL		
78	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	7	A	B	C	D	E	F	11	A	B	C	D	E	F	700 MHz UL			
72	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	11	A	B	C	D	E	11	A	B	C	D	E	700 MHz UL				
60	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	9	A	B	C	D	11	A	B	C	D	700 MHz UL				
48	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	7	A	B	C	11	A	B	C	700 MHz UL				
42	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	11	A	B	11	A	B	700 MHz UL					

Spectrum Clearing Scenarios



# TV's Gettysburg!

■ It is rather for us, **the survivors of the incentive auction**, we here be dedicated to the great **repack** remaining before us — that, from these honored **auction winners** we take increased devotion to that cause for which they here, gave the last full measure of devotion — that we here highly resolve these **stations** shall not have died in vain ; that the **industry**, shall have a new birth of freedom, and that **television** of the people by the people for the people, shall not perish from the earth.



# Repack Statistics

Clearing Target (MHz)	Cleared above channel	Full Power Stations Cleared	Class A Stations Cleared	Total Stations Cleared
126	29	922	211	1133
114	31	695	164	859
108	32	656	162	818
84	36	593	144	737

\* Figures are for the maximum number of stations. Final values will be lower dependent on results of reverse auction and who “winners” are.

## › Recent FCC estimates are:

- › 114 MHz Cleared 1393 Stations to Repack
- › 84 MHz Cleared 1274 Stations to Repack
- › Both include a minimum of 540 stations below cleared band



# Repack Implementation Timeline Example

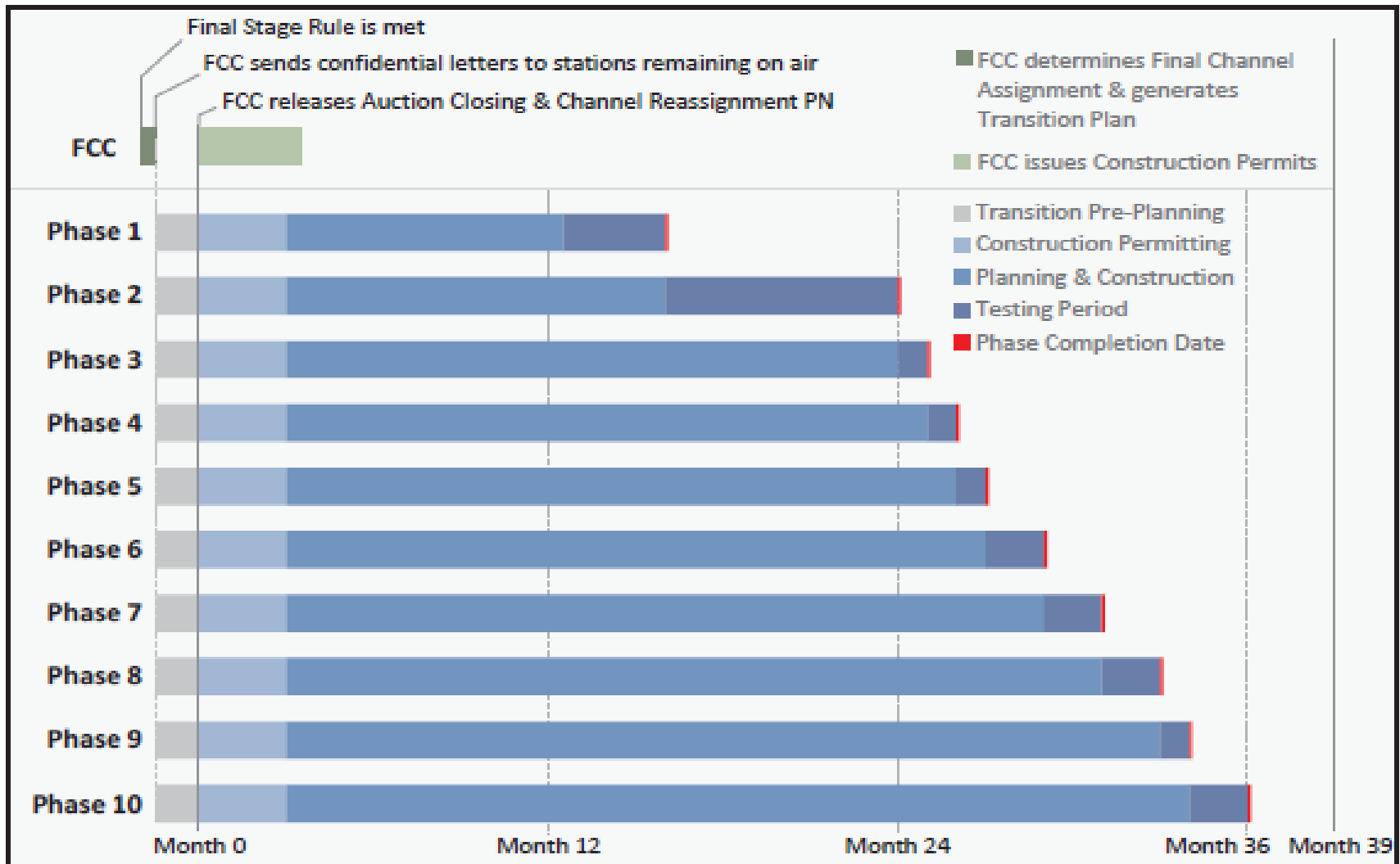


Figure 12: Phase Timelines at 114 MHz



# Repack Effects

- › Repack TV stations will need to switch out antennas for new channel antennas
  - › May need transmission line changes as well
- › Towers will need to be modified to support these new antennas
  - › Larger due to lower frequencies
  - › Tower structural standards have changed
- › Temporary antennas and feedlines will be needed to sustain operation during changeout
- › Old abandoned antennas and feedlines will need to be removed to increase capacity
- › Significant time will be required on “complex” sites for multiple antenna moves



# ATSC® 3.0

- **Standard complete Q1/Q2 2017 – South Korea to deploy February 2017**
  - › Variable bit rate provides robustness for multiple content services
  - › Full IP transport versus MPEG format in ATSC 1.0
  - › End-to-end synchronization – return path and seamless content delivery
  - › Hybrid broadcast OTA and Broadband Internet services
  - › Ability to stream rich content, launch new video services and deliver new business models
  - › Dramatically improves spectrum utilization
  - › SFN deployment for robust mobile coverage





# ATC – TV Transmission Facilities

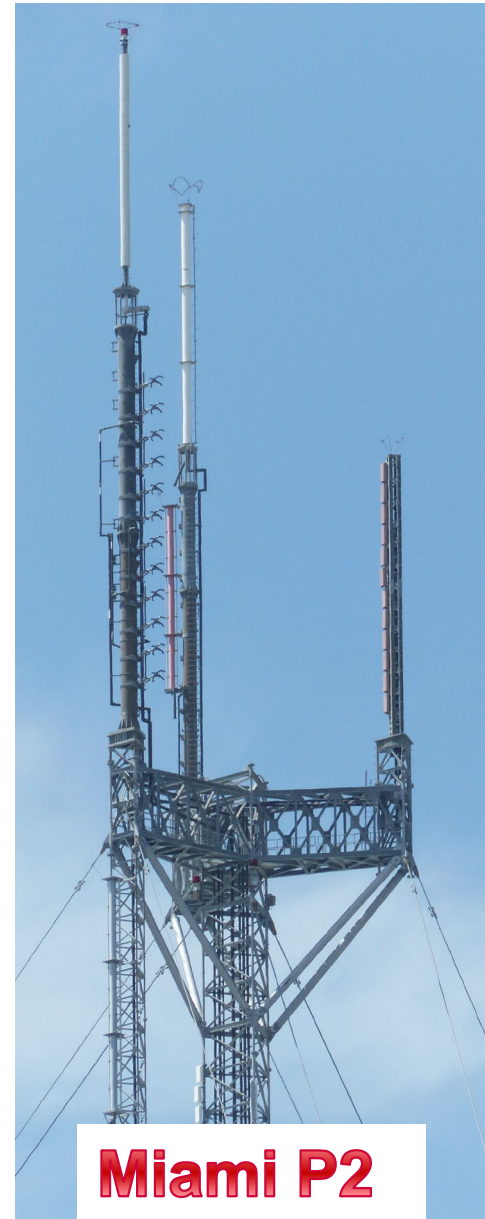
- **357** Full Power and Class A stations operate on owned, managed, & leased sites (**165 stations Ch. 32 and higher**)
- **181** towers with **ALL** FP and Class A service types – DT, DC, DX, DD
- **174** towers with at least **one** Full power/Class A TV
- **74** towers with **2+** Full Power/Class A TV
- **108** towers with channels **Ch. 32+** (assuming a 114 MHz clearing target)
- **65** “Complex” sites (Candelabra, Mountaintop, Broadband Antenna)
- **29** owned and operated Broadband UHF antenna systems
- **97** DMAs with towers supporting TV transmission



# Repack Effect Examples



- 9 full power tv's
- 4 "likely" repack tv's
- Numerous FM operations



# Repack Effect Examples



- 9 full power tv's
- 3 “likely” repack tv's
- 2 UHF Broadband Antennas
- Numerous FM operations



# Repack Effect Examples



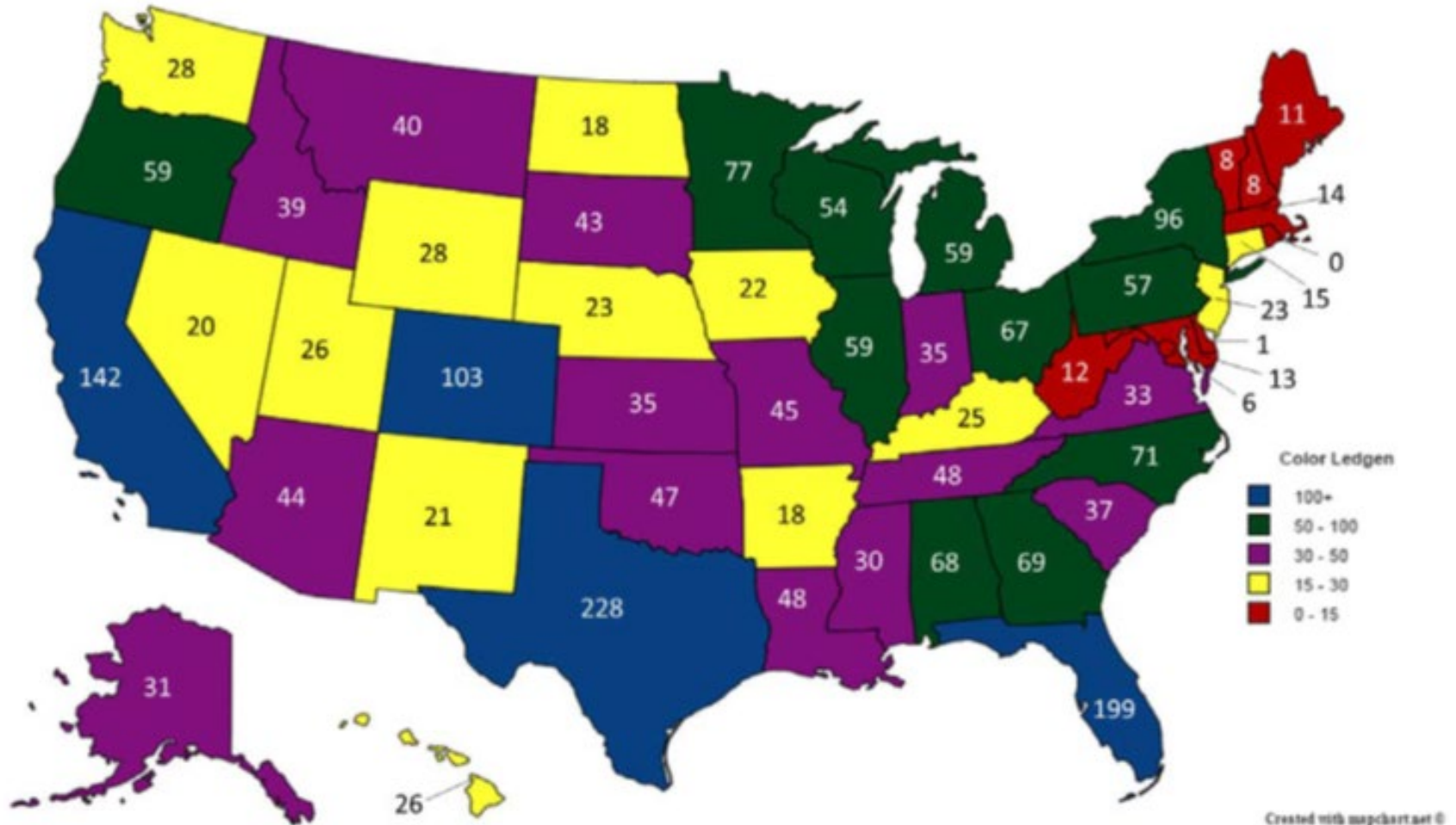
- 1 full power tv
- 1 “likely” repack tv
- Numerous FM operations

**Dallas  
Cedar Hill West**





# Stations Collocated With TV



Number of full power FM stations collocated with TV stations in each state



# Stations Collocated With TV

According to FCC & ASRN data:

- › **1153** towers in the US have collocated FM and TV
- › **2368** FM radio stations/translators could be impacted by repack
- › **1300+** full power (10% plus)
- › These are conservative estimates
- › Very few have auxiliaries on different towers



# Repack Reimbursement

“For example, where multiple stations share a tower, a reassigned station that makes changes may be required to cover certain expenses incurred by other tower occupants. In such circumstances, **the Commission will consider a claim** from the reassigned station for reimbursement of such costs, **so long as** the reassigned broadcaster **has a contractual obligation to pay these expenses** through a contract entered into on or before [June 2, 2014].”

**We have asked for clarity on how this will effect FM stations on TV towers but as of today, FM stations are not directly able to submit (or have the TV station submit) for temporary of auxiliary system expense reimbursement in most cases!**

Cite: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Report and Order*, 29 FCC Rcd. 6567, paras. 601-2 (2014).



# What To Do About These Effects

- › Research what TV's are on tower and where they are relative to your antenna
- › Understand who MIGHT be effected by Auction/Repack
  - › Are stations in clearing target
  - › Stations that “win” in the auction may require decommissioning
  - › Channels outside of clearing target may still be repacked
- › Understand whether you will need to shut down during repack tower work
  - › Is operation in aperture of effected antenna?
  - › Is operation in a location that will be needed for rigging



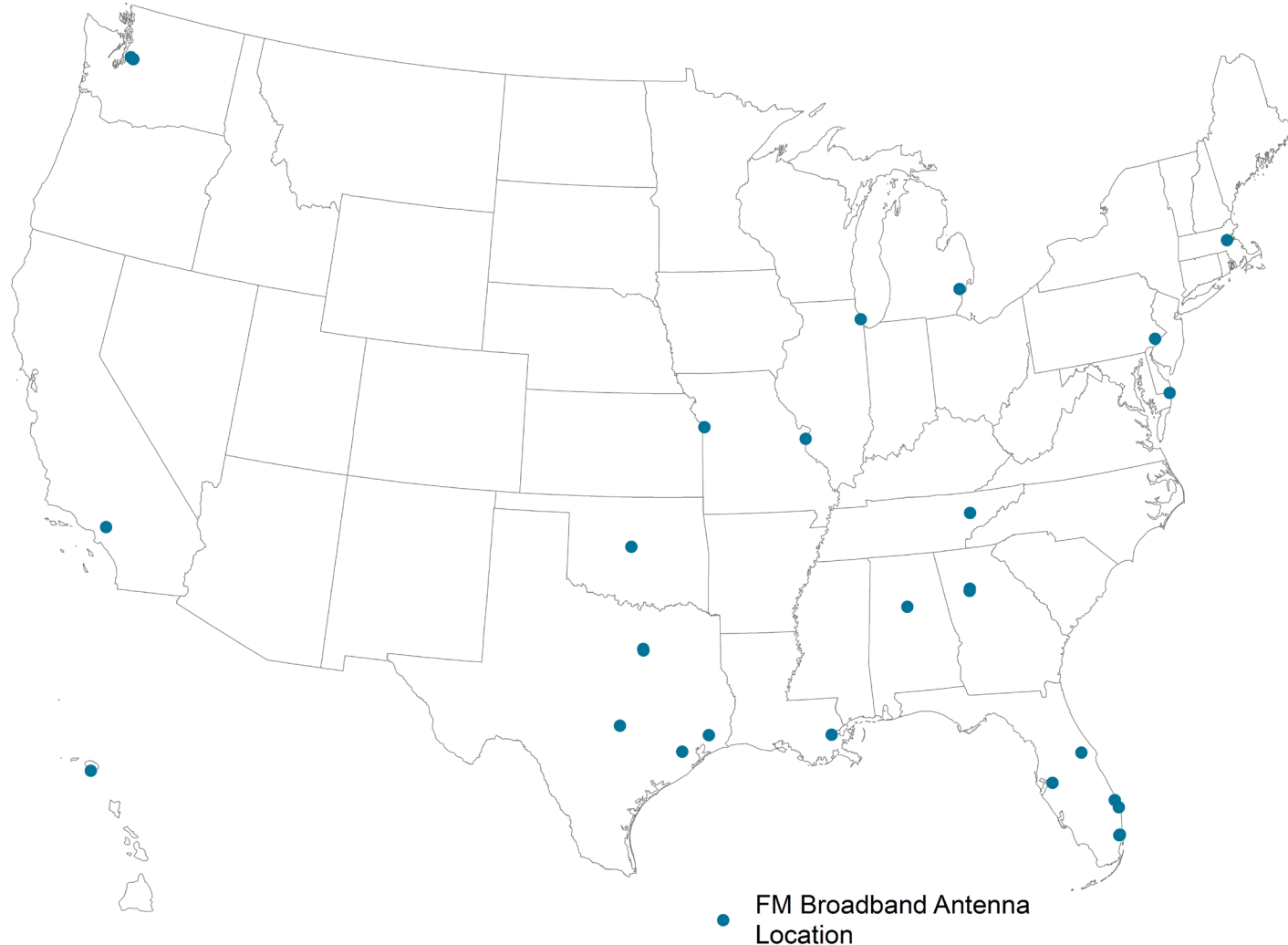


# What To Do About These Effects Continued

- Evaluate opportunities for temporary or auxiliary operation
  - On same tower
    - What is available capacity and aperture
    - Are there other stations that I could combine with?
    - Is there an existing broadband antenna system?
  - On separate tower
    - Recommended solution if a tower with minimal TV operations is available
    - Same questions
- Evaluate coverage effects from these operations
- Construct a new temporary or auxiliary operation



# Existing Broadband Systems provide alternatives that can be exploited

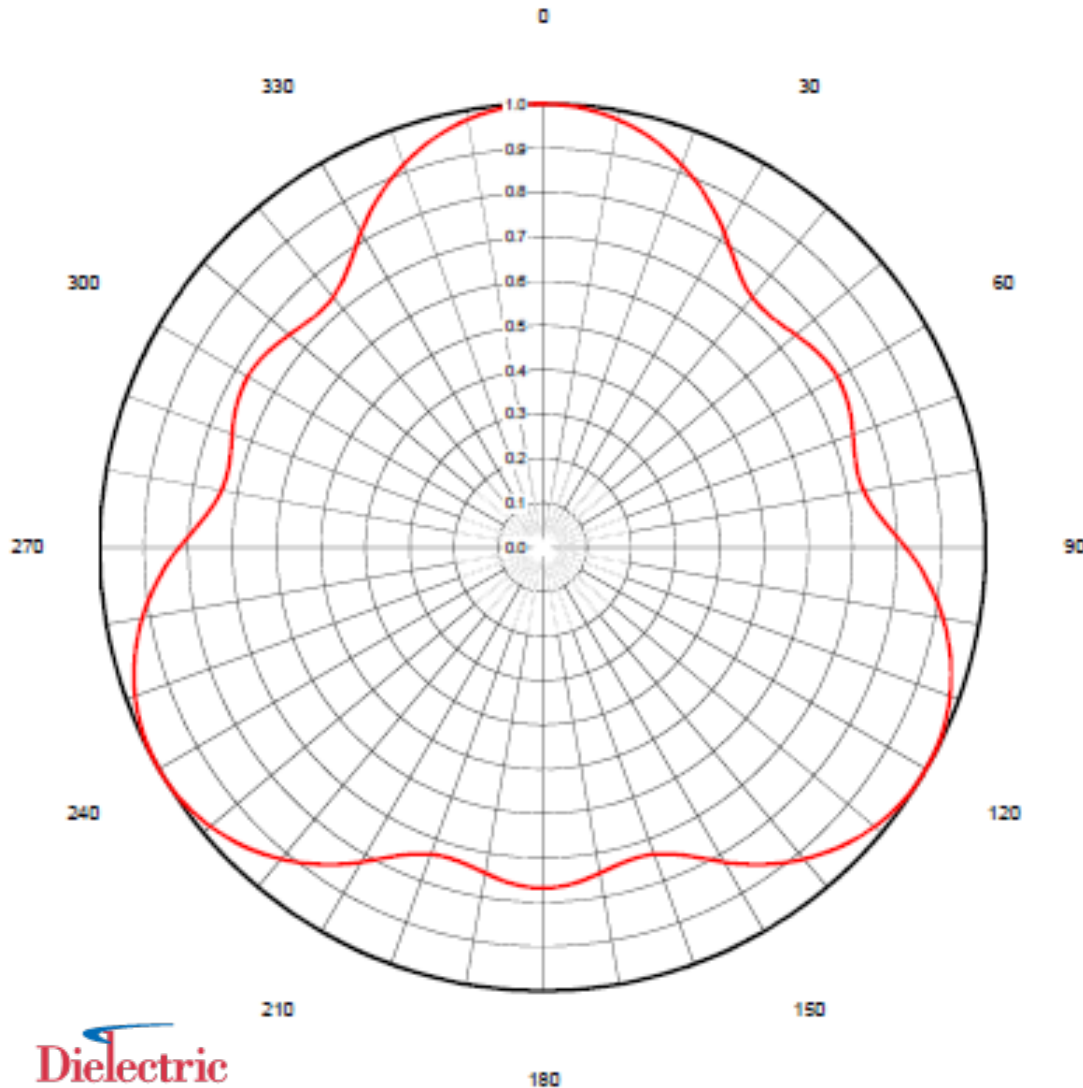


# Master System Expansion

- › Most systems can handle one or more aux stations
  - › Addition of Constant Impedance Modules
  - › Into current broadband port
- › Peak and Average power capacities must be considered
- › Need to consider existing module filter characteristics
  - › Number of sections (i.e. 3 , 4 or 5 determines frequency spacing)
  - › Isolation available to new station
- › Physical space for module and TX



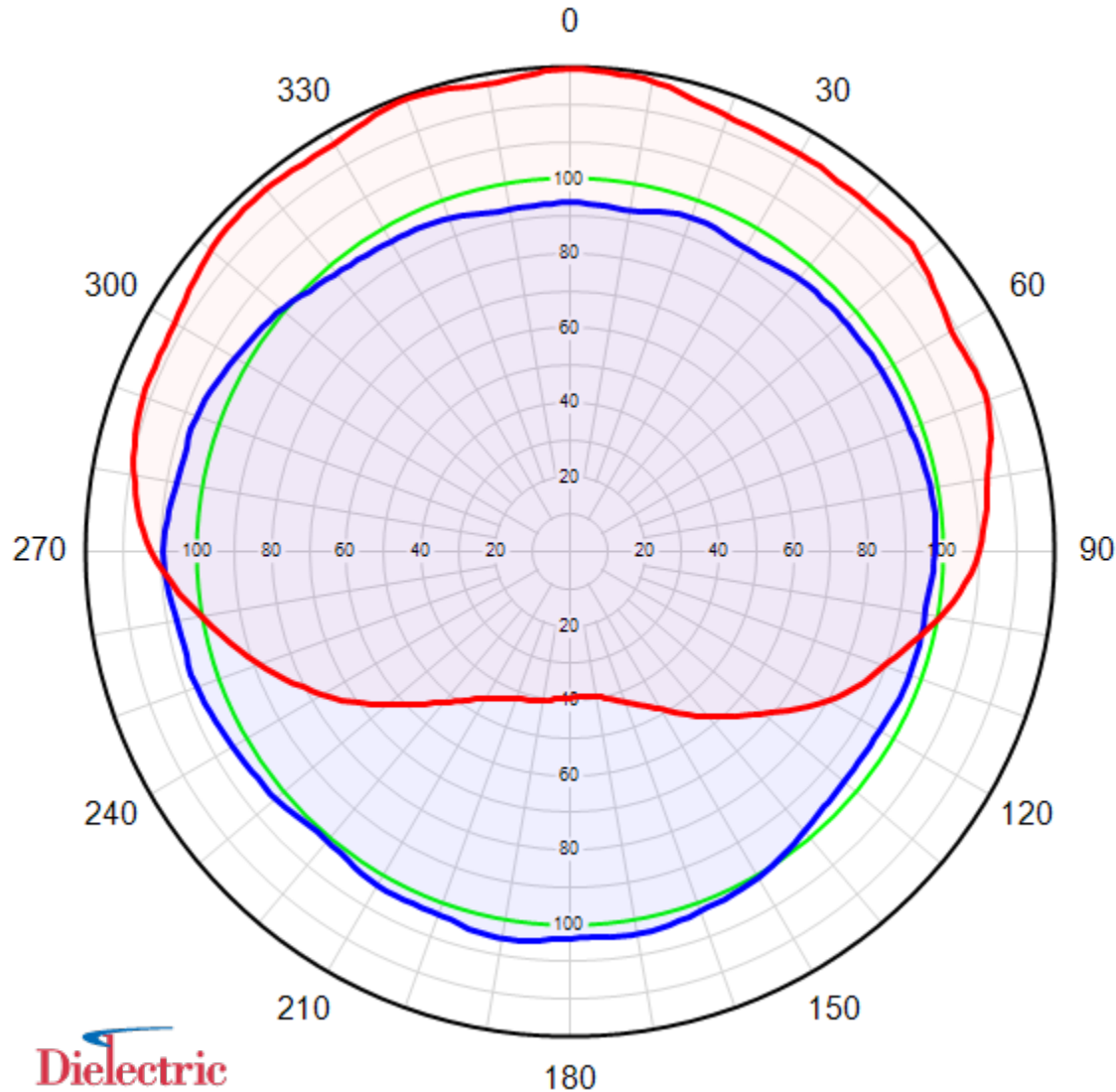
# Top Mount vs Side Mount



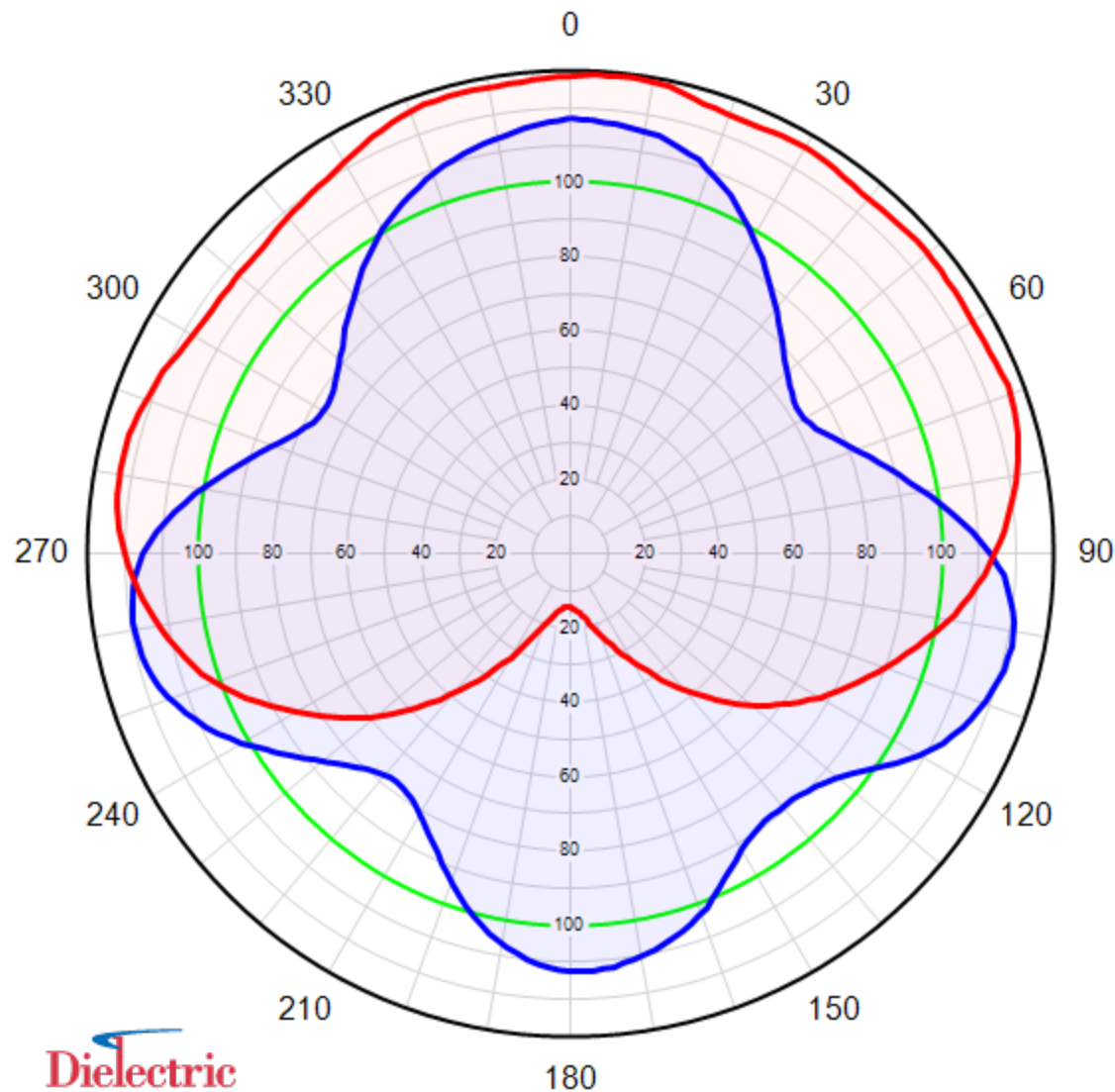
Horizontal and Vertical Polarization patterns are very nearly identical

**Top Mount  
3 Around  
Panel Antenna**

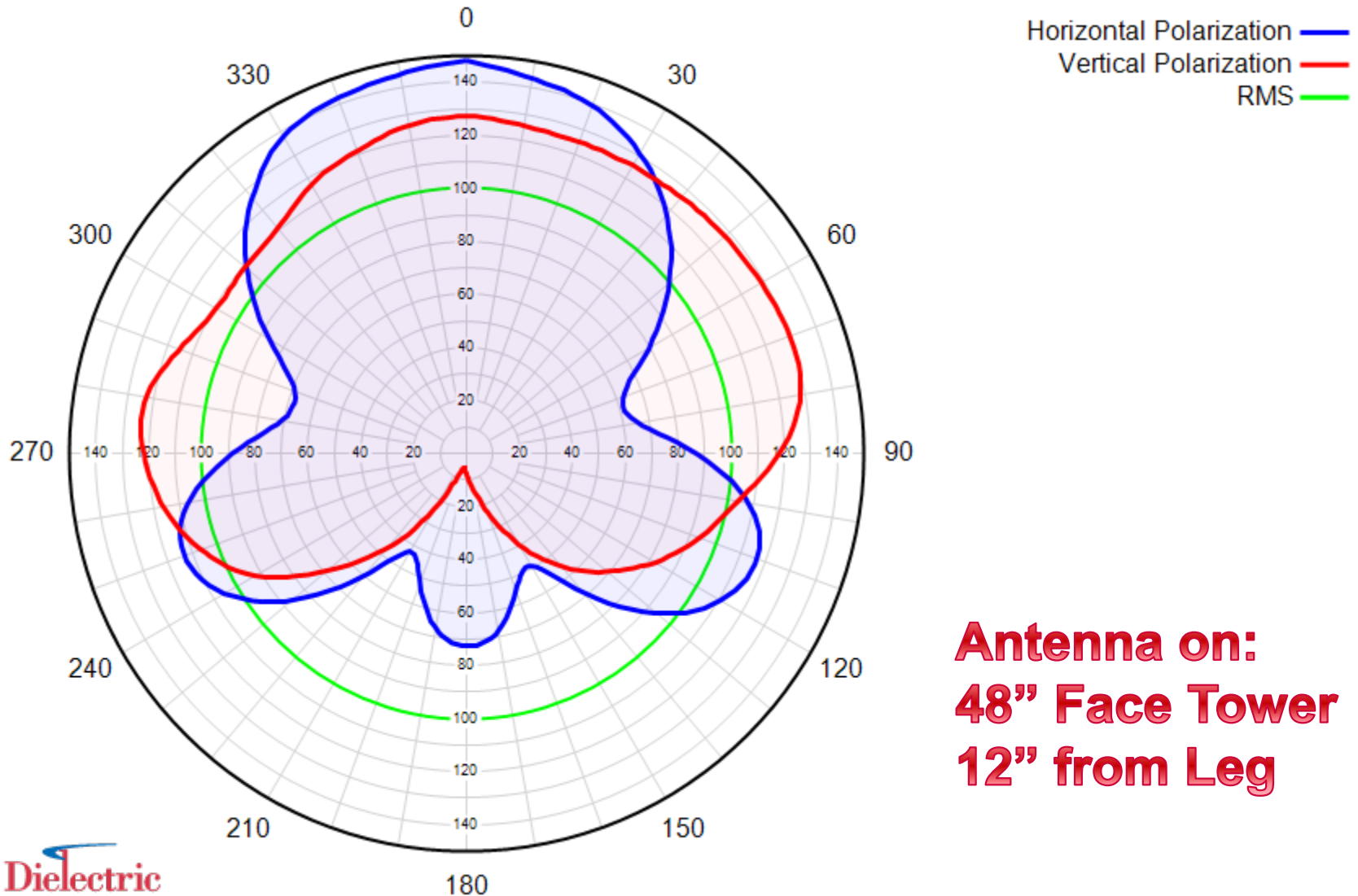
# Top Mount vs Side Mount



# Top Mount vs Side Mount



# Top Mount vs Side Mount

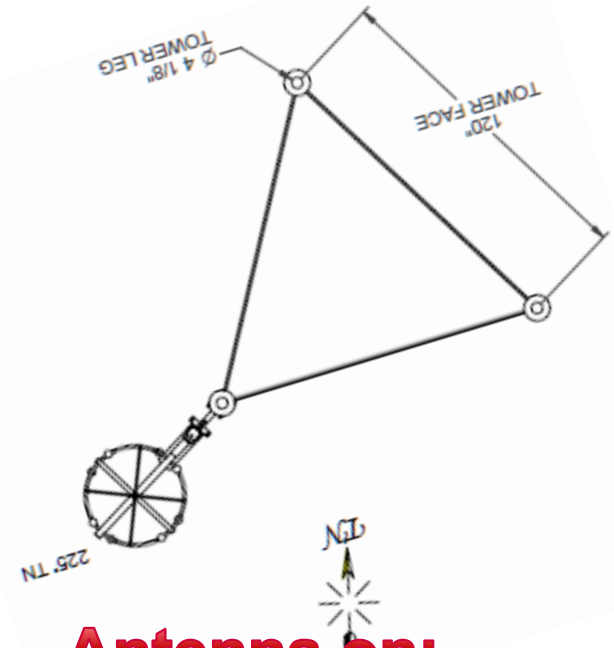
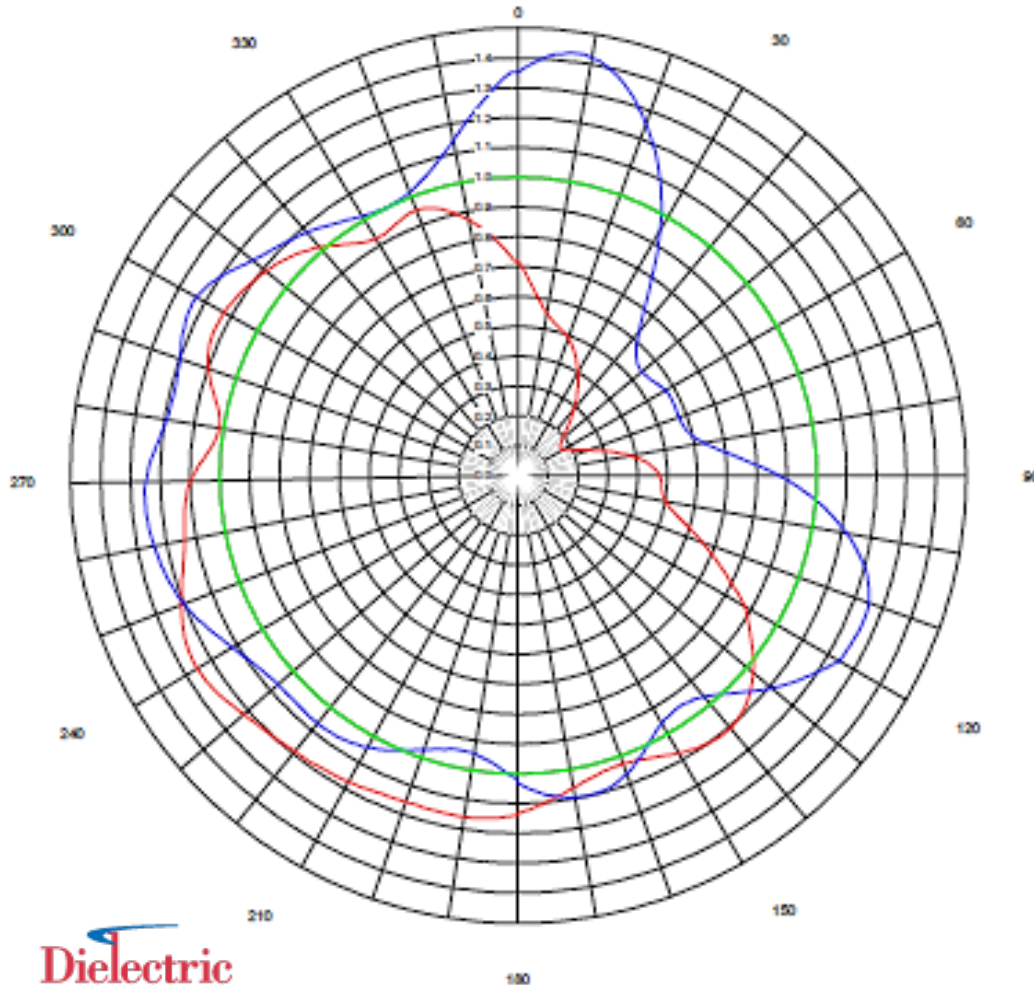


# Top Mount vs Side Mount

HPOL Gain 1.79 (2.53 dB)  
VPOL Gain 1.83 (2.62 dB)

Blue  
Red  
Green

HPOL  
VPOL  
RM3



Antenna on:  
120" Face Tower  
12" from Leg





**So in conclusion:**

**Repack Is Coming!  
Get An Off Site Aux Now!**

**Are there any questions?**

