



**MaxxCasting™ ZoneCasting™**

**Advanced Single Frequency Networks**

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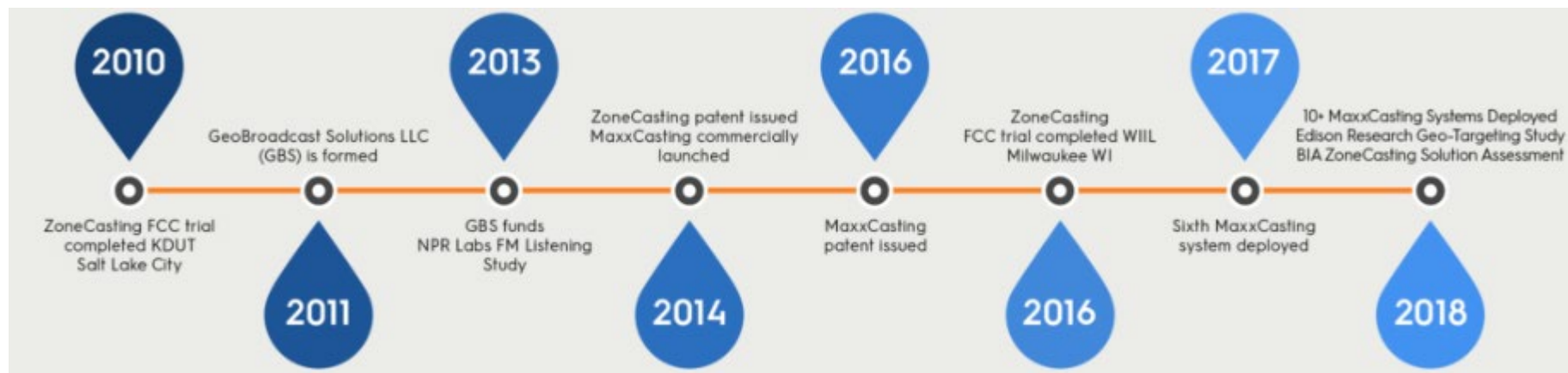
2019 New York NAB Convention

# What We'll Discuss

- Who is GeoBroadcast Solutions (GBS)?
- R & D of FM SFN Design how it relates to Next Gen TV
- Introduction to Maxxcasting, how it works
- Example of FM and TV Next Gen SFN design in real world
- Examples of Maxxcasting systems on-air in Boston, San Diego
- Introduction to Zonecasting, geo-targeted SFN
- Regulatory environment, SFN and geo-targeted SFN, TV & FM

# About GeoBroadcast Solutions

- GeoBroadcast Solutions (GBS) formed in 2011 to develop the **ZoneCasting**<sup>™</sup> Geo-Targeting platform (Geo-Fencing **audio** delivery)
- Petition for Proposed Rule Making is at the FCC which would allow full time Geo-Targeted separation of the MAIN audio channel of an FM radio station to its listeners
- Out of this development effort came **MaxxCasting**<sup>™</sup>, which increases signal quality, PPM watermark decoding, and allows Geo-Targeting of **radio screen advertising**



# MaxxCasting™

## What is it?

- The system deploys booster cell sites within the broadcaster's legal service area
- Sites are single frequency network (SFN) transmitters that broadcast in a simulcast (synchronized) manner – Seamless transition
- Patented design of the system is such that the radio signal coverage and quality is greatly improved, resulting in higher listening, vastly improved Nielsen PPM decoding, higher ratings and revenue
- Allows geographic targeting of RDS radio screen messaging and some HD channels TODAY providing additional revenue opportunities



MaxxCasting™

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

ZoneCasting™

# Obstacles to Overcome

1. There was virtually no objective criteria to determine how much self-interference would be tolerable to listeners.
2. In order to determine exact C/I ratios very exact propagation modeling would be needed.
3. In order to synchronize the SFN “Nodes”, equipment was needed to exactly match and delay the program material.
4. Antennas needed to be designed to minimize delay spread based upon testing results.

# 1- Develop Objective Criteria for Design

GBS Commissioned:

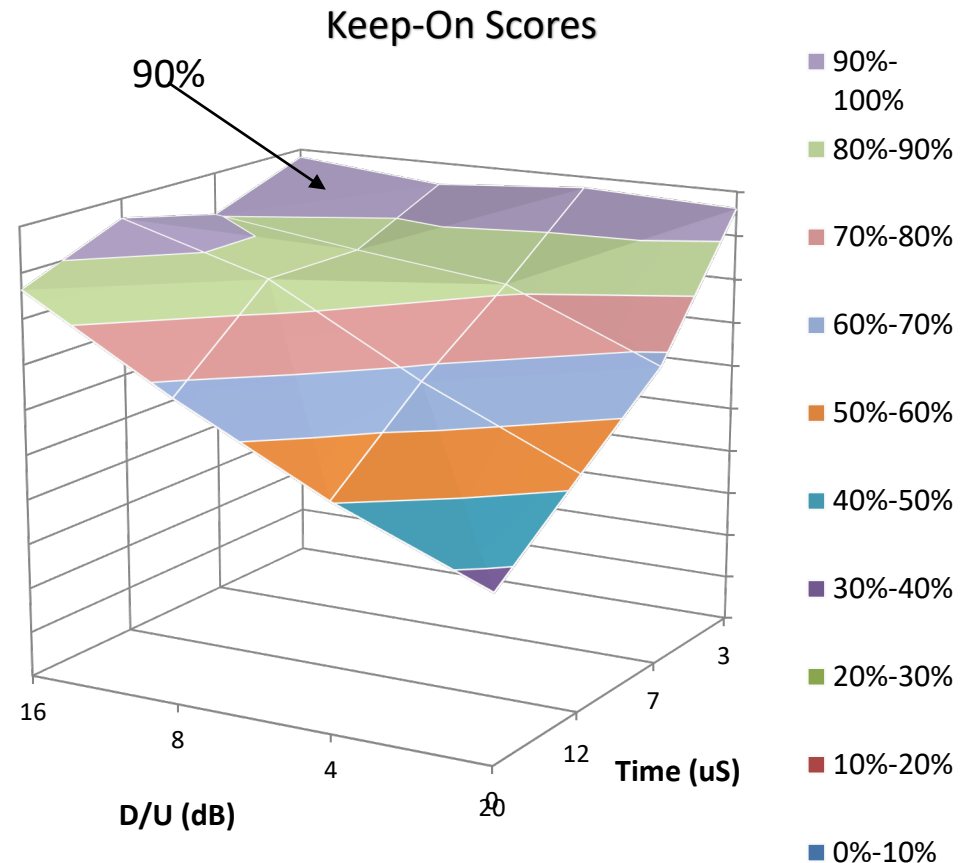
Largest FM simulcast listening study on record by NPR Labs / Towson University

Listeners evaluated what would cause them to tune out

- 533 samples/19k data points, 80 listeners
- Mono and stereo modes
- Speech, music, voiceover
- Time delay between signals
- RF ratios between signals

All combined to determine  
“Keep On” score

Standards for acceptable interference thresholds



## 2- Signal Analysis, Propagation Modeling

- Best in Class Measurement Equipment such as Worldcast FM MC5 lab quality modulation analyzer with Golden Ear™

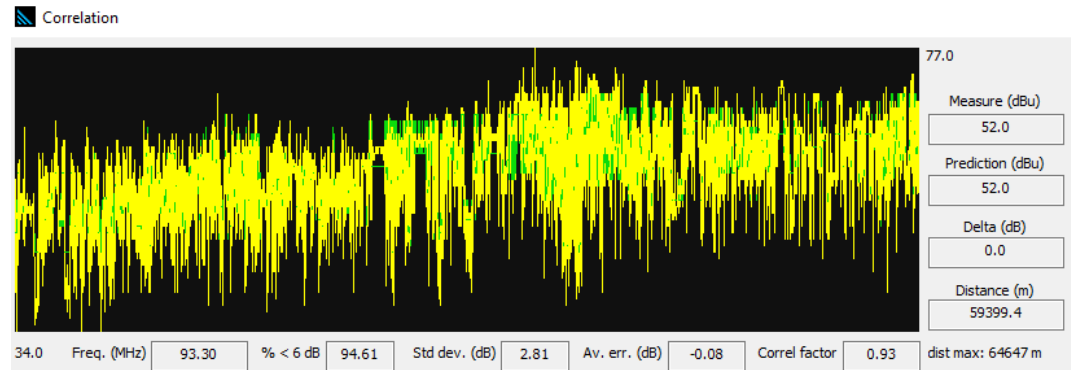
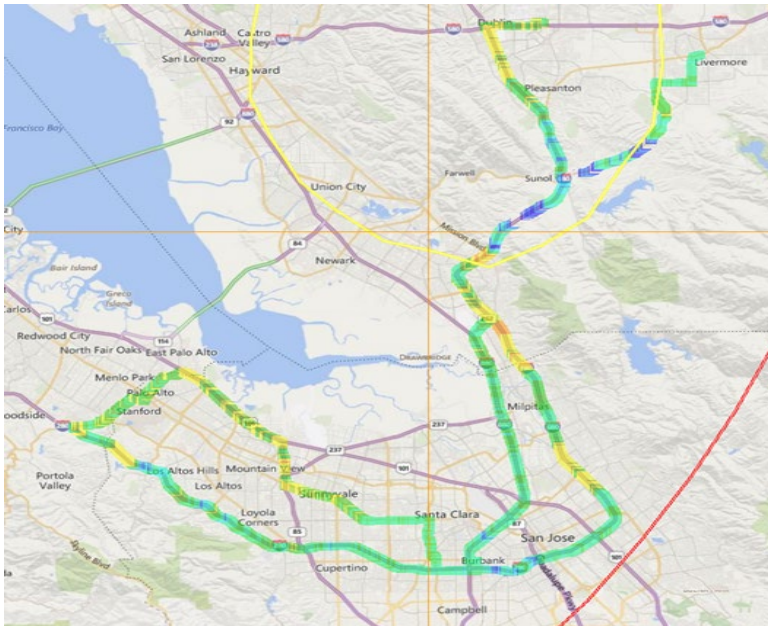


- GBS proprietary design modeling. Runs on the ATDI ICS TELECOM platform and others being developed, a leading industry tool for radio network planning and spectrum engineering



# 2- Propagation Modeling

- Typical propagation predictions are not accurate enough. Without consideration of ground reflections they are mostly optimistic when predicting to automobile antennas.
- Drive test correlated and corrected models are key
  - EX: Model ITU 525/526 with Deygout diffraction and reflectitons



Drive Test Correlation (Audemat MC) with ATDI Model



# Signal Analysis

- Watermarking (PPM) is affected by Signal Quality
  - A PPM signal, sent by the encoder in a poor RF environment (low level, multipath, interference) often does not get decoded by the Portable People Meter (PPM)
  - “If the PPMs aren’t decoding, you might as well be off the air”
- Measurement- Telos developed the Voltair processor and the TVC15 Watermark Analyzer & Monitor to improve & monitor the Neilson encoding

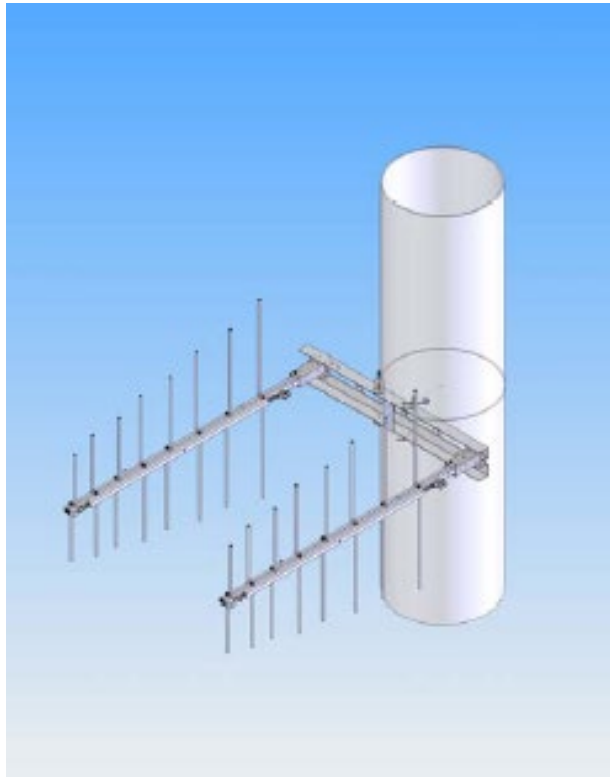


# 3- Synchronization

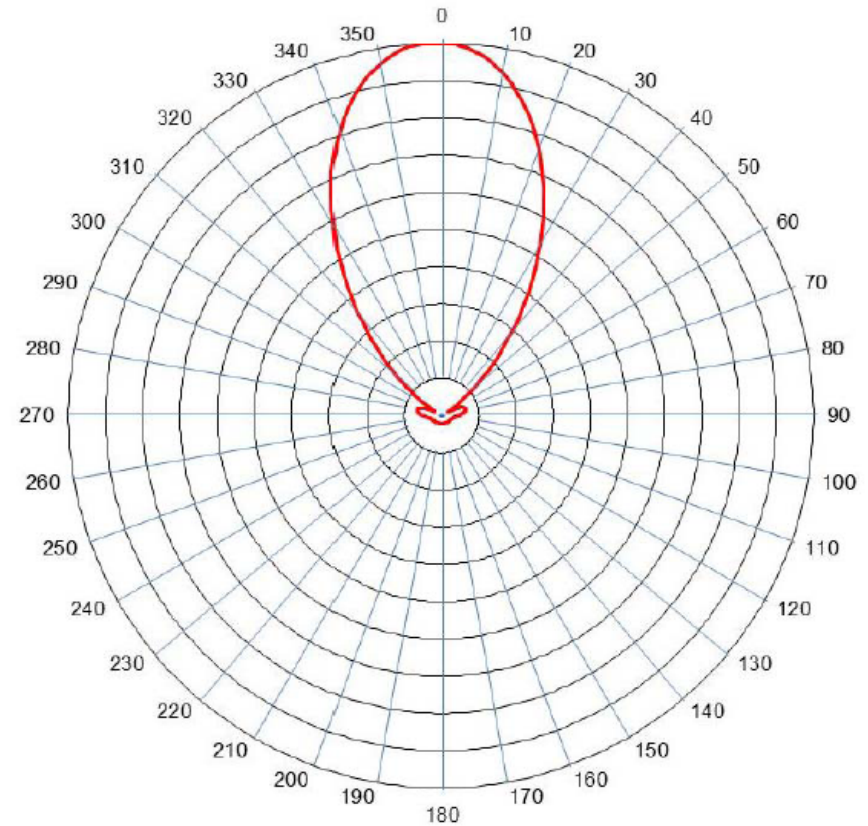


- IP Connectivity with FEC, Dynamic Stream Splicing
- Precise Duplication of Composite FM Waveform
  - Modulation
  - Waveform
  - Stereo phase
- Synchrocast™ Time delay within  $\pm 2 \mu\text{sec}$

## 4- MaxxCasting™ Highly Directional Antennas



Azimuth Pattern, Linear Scale



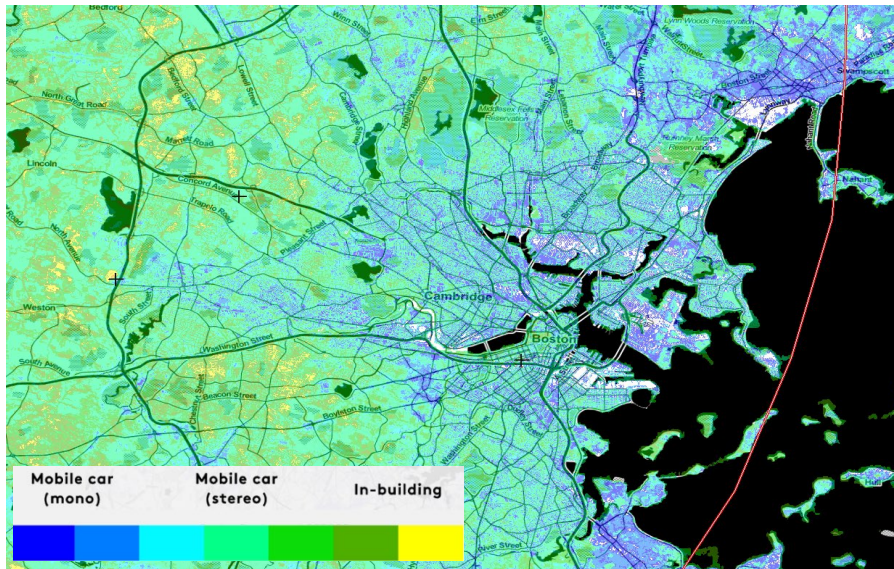
Minimized Delay Spread

# MaxxCasting™

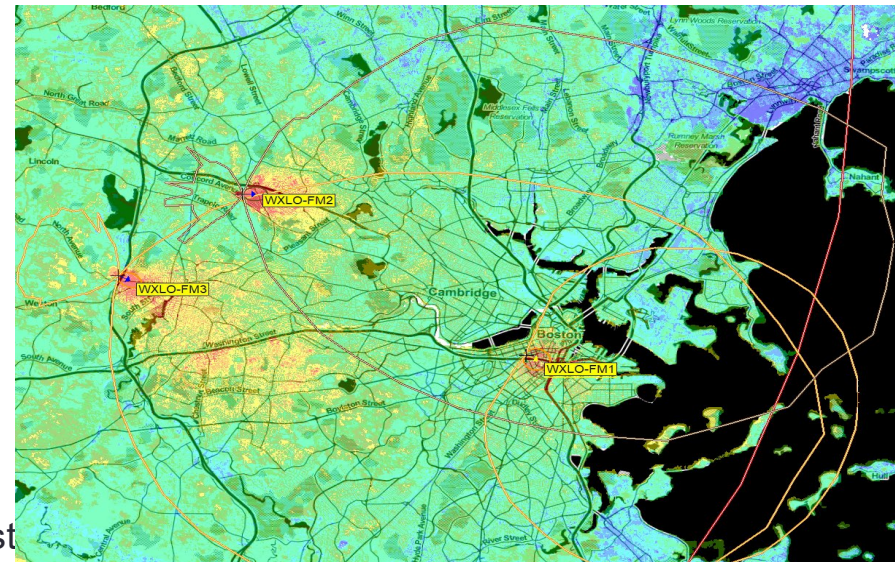
## Example Deployment

- Cumulus WXLO-FM
- 37 kW Class B station 40 miles west of Boston
  - A “Worcester” market station (#121)- Now in Boston (#10)
  - Radio Screen Geo-Targeting (today)
  - Audio Geo-Targeting candidate (tomorrow)

**BEFORE**



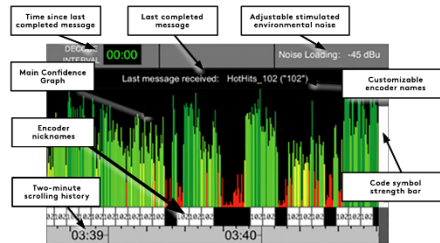
**AFTER (1M POPs ADDED)**



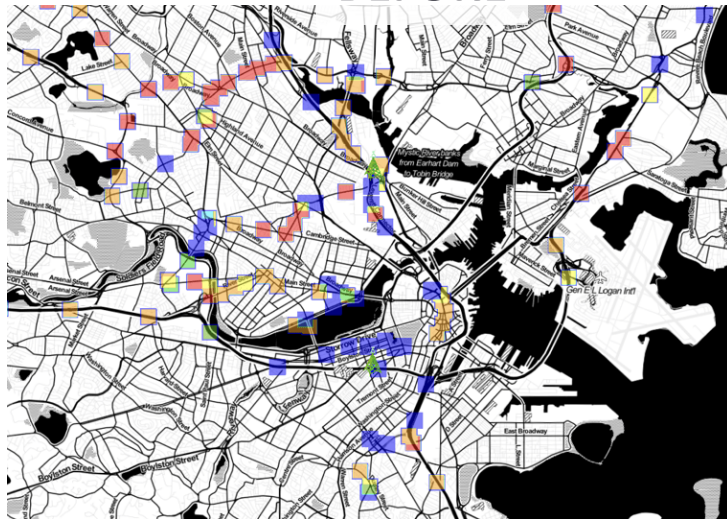
# MaxxCasting™

# Nielsen PPM and Ratings

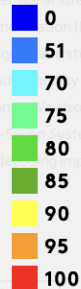
- RF Signal level is typically the most important component of audio quality
- If there isn't enough signal then watermarks can't be decoded, and there are no ratings!
- We process the audio signal thru a TVC-15 Watermark Analyzer for PPM decoding improvements



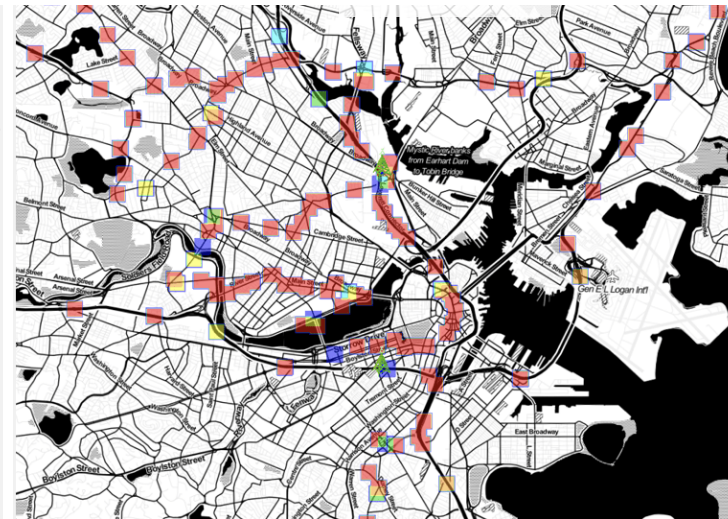
**BEFORE**



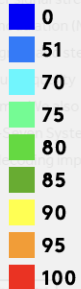
**% Decoded Messages per Minute TVC15 (noise loading -10 dBu)**



**AFTER**



**% Decoded Messages per Minute TVC15 (noise loading -10 dBu)**



MaxxCasting™

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ZoneCasting™

# MaxxCasting™

## Example Deployment

### Trend Jan/Feb/Mar/Apr 2019 M - F 6 AM to 7 PM

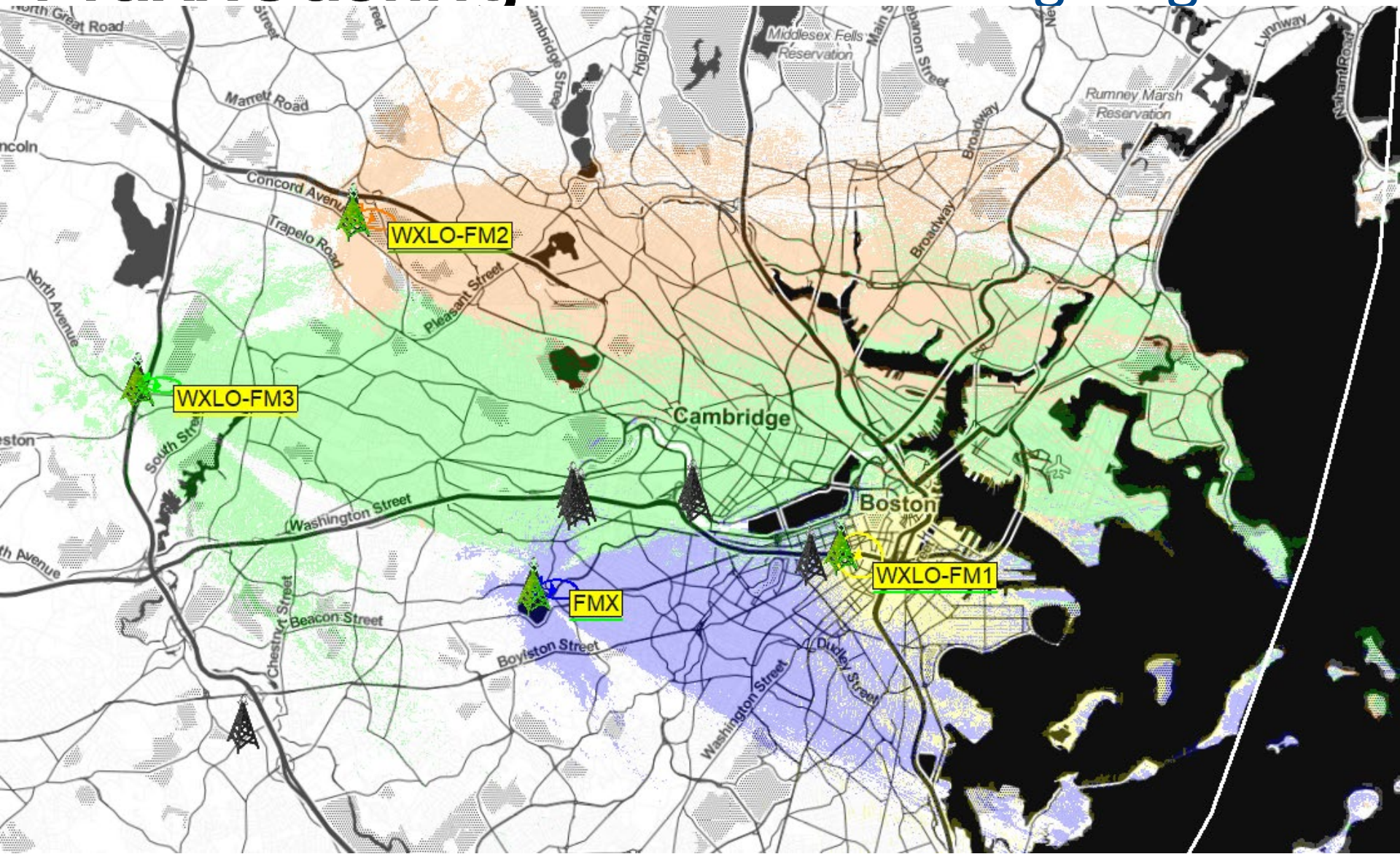
BOSTON (Metro Survey Area)  
APR19, MAR19, FEB19, JAN19  
Stations Rankings Based on: Top 15 All Stations

Station	Estimates	JAN19	FEB19	MAR19	APR19*	Last Survey	
<b>Women 25-54</b>							
M-F 6a-7p							
<b>6</b>	<b>WXLO-FM</b>	<b>Average Persons *</b>	1,900	1,900	2,200	2,900	31.8
		<b>Average Share</b>	3.2	3.3	3.6	4.7	30.6
		<b>Average Rating</b>	0.3	0.3	0.3	0.4	33.3
		<b>Weekly Cume Persons</b>	61,500	67,500	65,700	70,200	6.8
		<b>Weekly TSL (Hr:Min)</b>	2:00	2:00	2:15	2:30	11.1

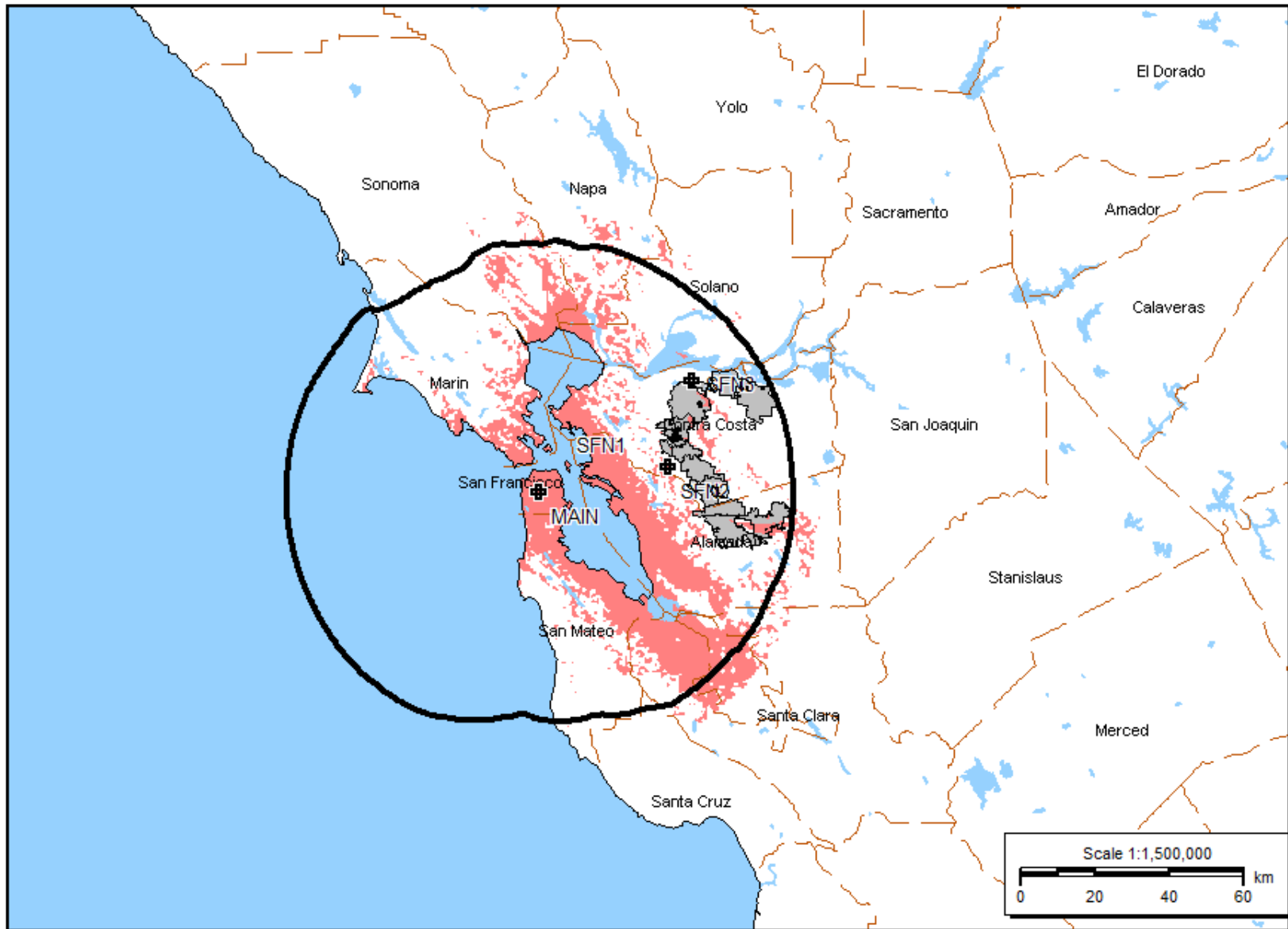
“Anytime that a station can go up in both cume and share, that is a good win. WXLO Cume is up almost 15% from January, in their target demo of W 25-54. It’s also up over 20% in share. Looking at W 35-54, the cume is up a modest 8%, but the share is up a whopping 53% from January. More people in their target are listening for more time.” \*

# MaxxCasting™

# RDS Geo-Targeting WXLO

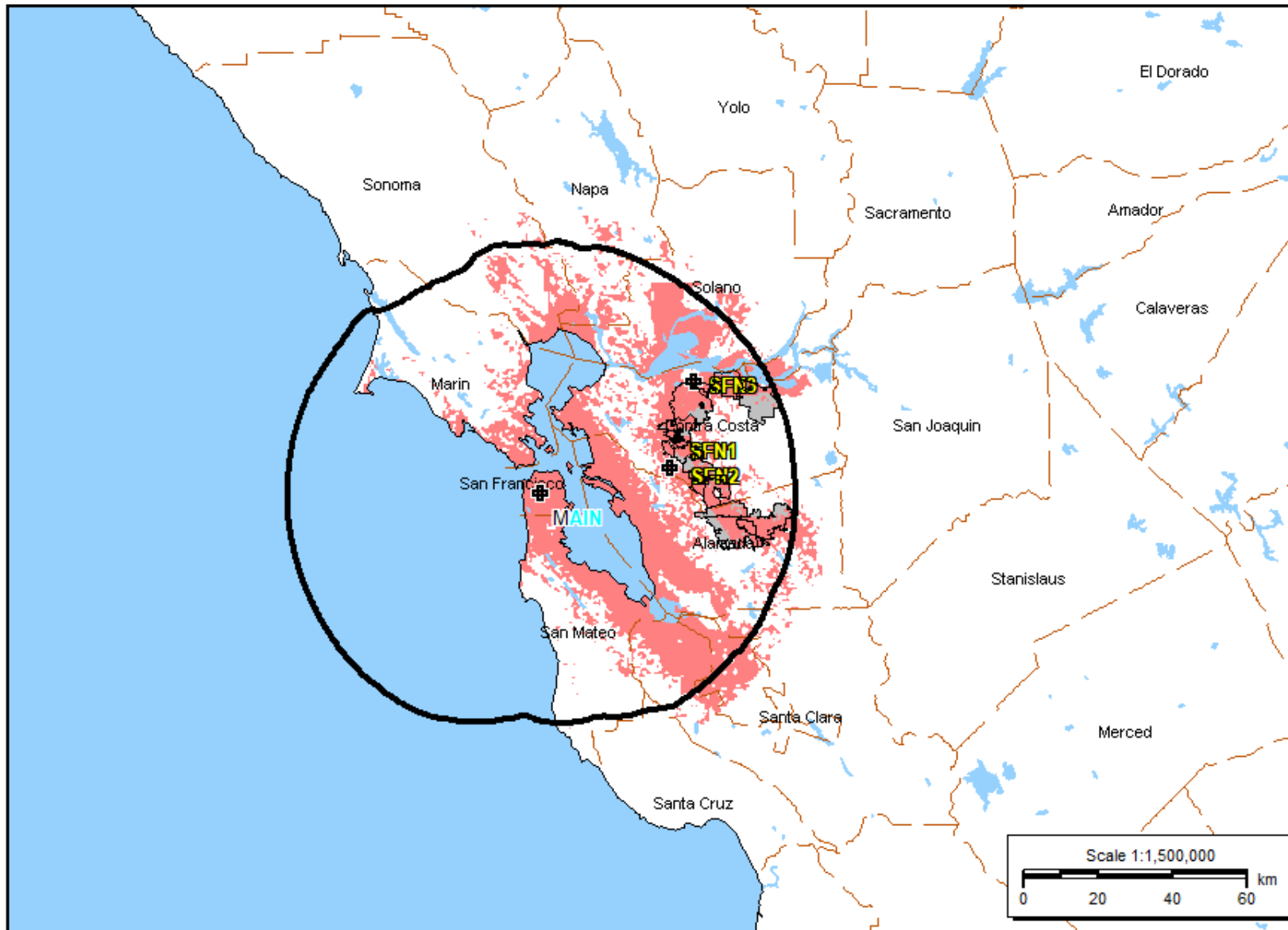


# Example San Francisco FM Coverage, East Bay



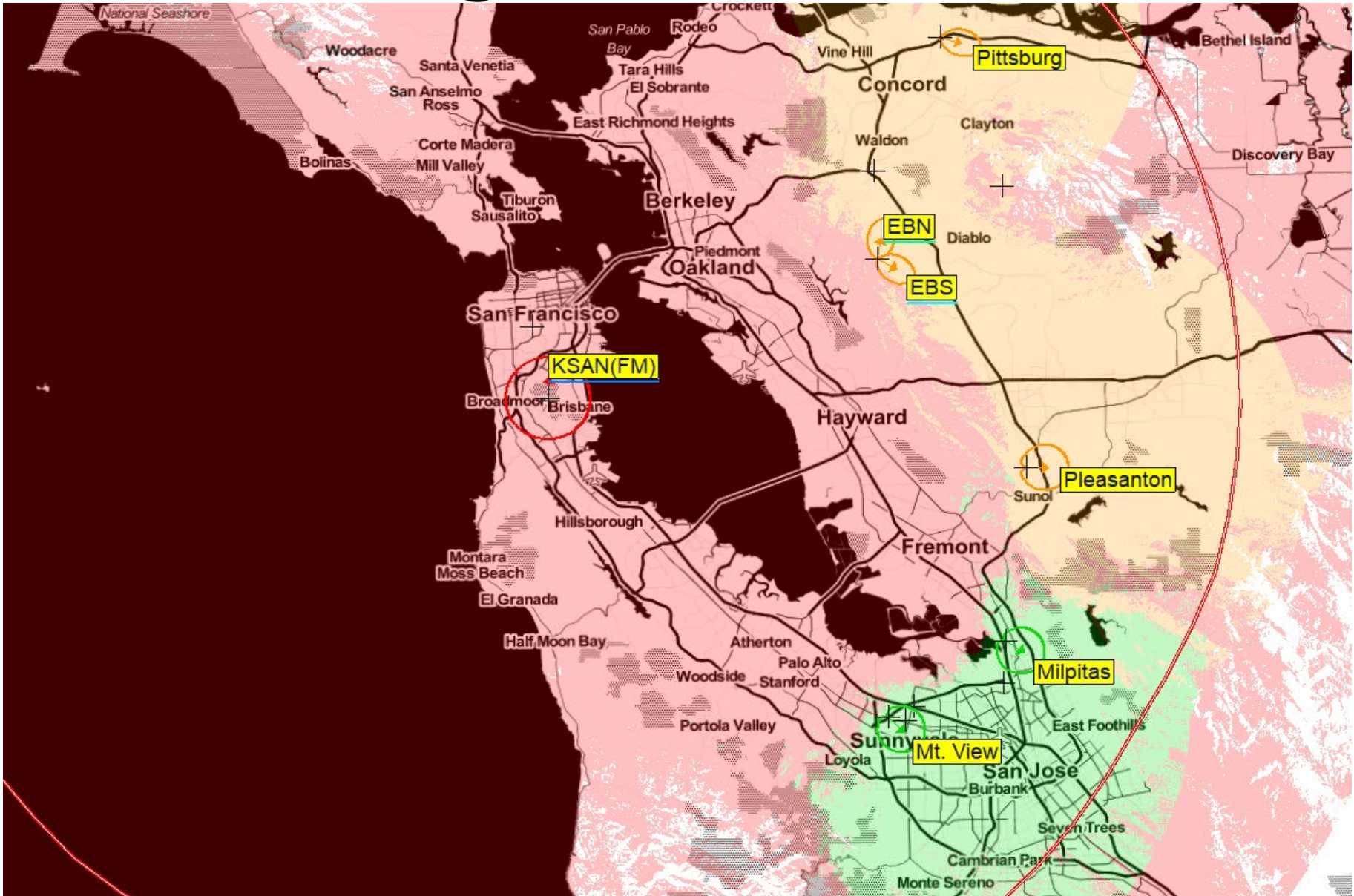


# Example San Francisco FM Coverage With SFN, East Bay

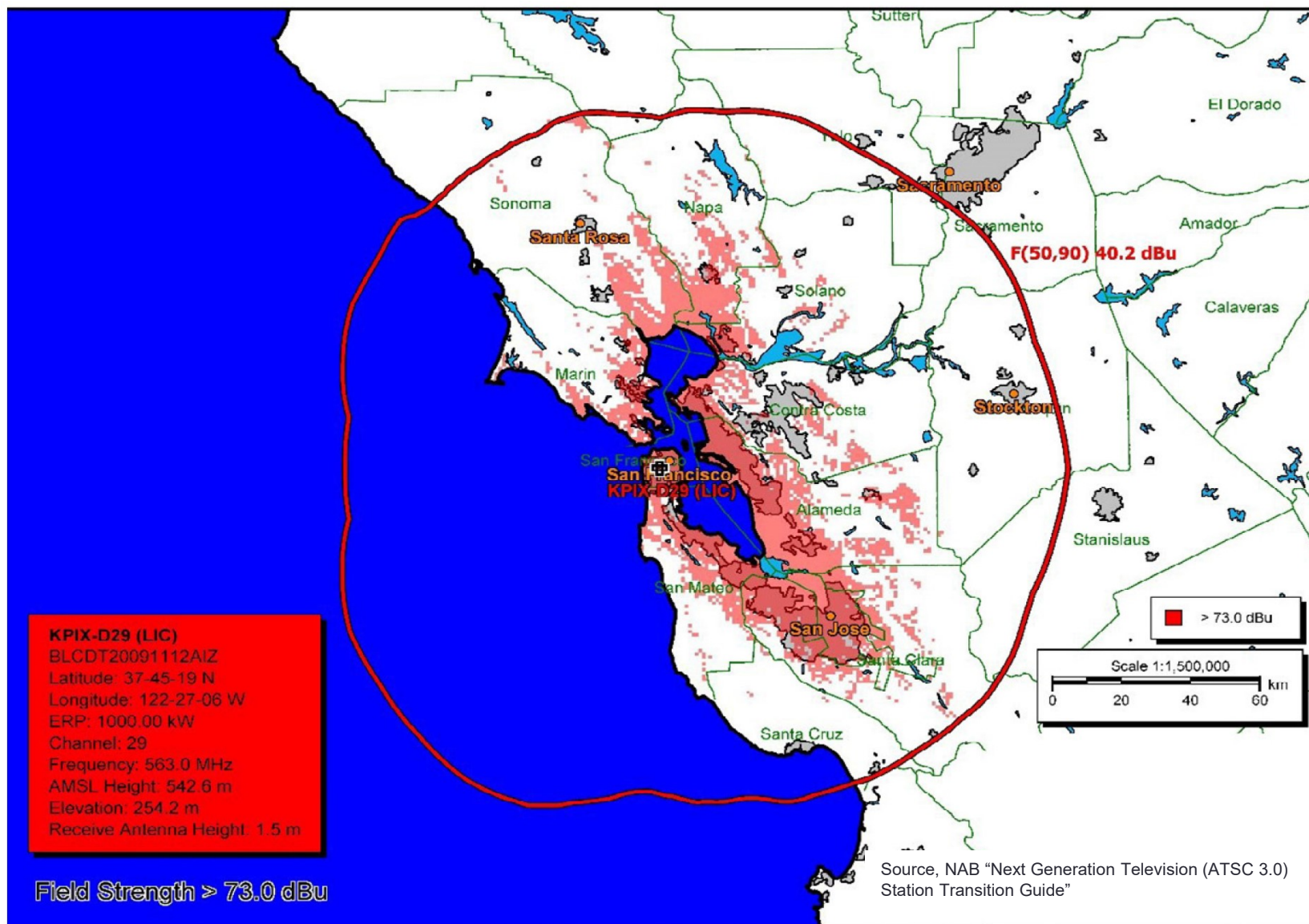


# ZoneCasting™

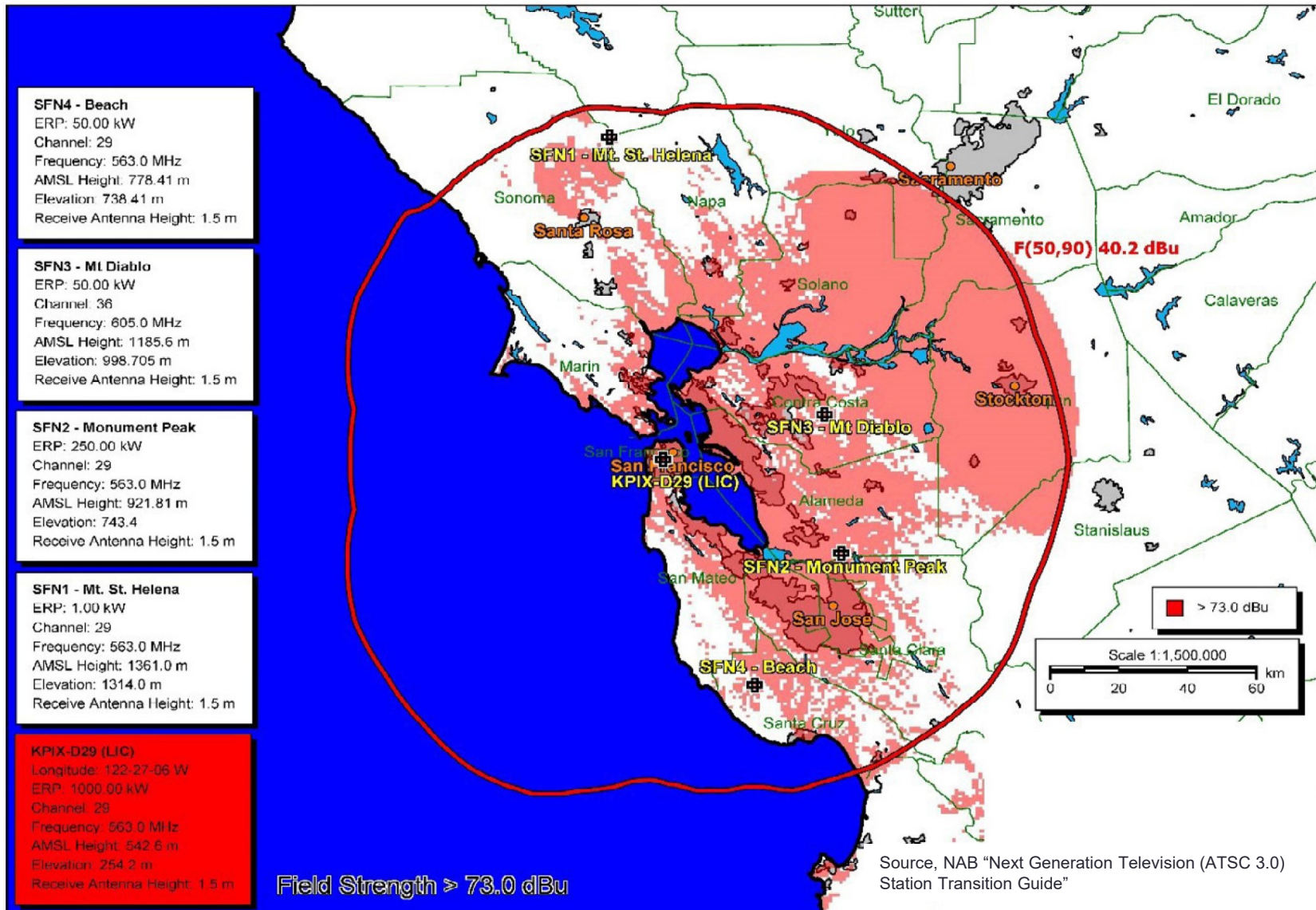
## RDS Fenced Zones- SF



# Example San Francisco ATSC 3.0 Coverage



# Example San Francisco ATSC 3.0 Coverage With SFN



# MaxxCasting™

## MaxxCasting™ Map Of Deployments\*



# MaxxCasting™ Summary for Broadcast Radio

- Deployed and Available Today
  - Increases signal quality and power, PPM watermark decoding
  - Allows Geo-Targeting of RBDS ON-SCREEN advertising
- GBS licenses technologies to broadcasters
- GBS provides turn-key network deployment
  - Initial Measurement and Design
  - Site Identification, Acquisition, Construction, Project Management
  - FCC Licensing
  - Final System Measurement, Optimization, and On-Going Maintenance
- **Potential to share network elements which lowers broadcaster costs**

# GEO BROADCAST SOLUTIONS

## ZoneCasting™

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Geo-Targeted SFN

# ZoneCasting™

## How it Works

- A network “cluster” of synchronous SFN boosters originate programming separately from the primary station
  - This is transmitted in a geographical area called a “Zone”
  - Inside the Zone it is conceptually similar to a MaxxCasting™ System
- By broadcasting different programming, a Zone allows for Geo-Targeted content delivery to listeners
  - Also called Geo-Fencing in the mobile world.....We call it ZoneCasting™
- Typically Geo-Targeting is active during commercial advertising or content delivery to targeted listeners, at specific times
  - Multiple Zones =multiple spots delivered simultaneously=more revenue \$
- When ZoneCasting™ is not active some of the boosters go into MaxxCasting™ mode, with all the associated benefits (coverage etc.)



# ZoneCasting™

## Why is it Important?

- Builds upon the Maxxcasting platform to add zoned, geo-targeted programming
- With advent of Next Gen TV, Radio is the now the ONLY mass medium WITHOUT the ability to Geo-Target content
- Geo-Targeted content is increasingly valued by consumers AND advertisers AND would be for radio broadcasters if it were available
- Recent research October 2018 clearly shows this

- What does it mean to be local? Radio's big new opportunity\*



- Opportunity Assessment for Local Radio Stations with Zoned Broadcast Coverage\*



\* Additional information upon request

# Edison Research Study 2018

How much do you agree/disagree...

"You would pay more attention to ads on the radio if they were for business or products in your local area."

Strongly Agree/Agree:

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77%



# Edison Research Study 2018

Strongly Agree/Agree:

72%

GEO BROADCAST  
SOLUTIONS



How much do you agree/disagree...

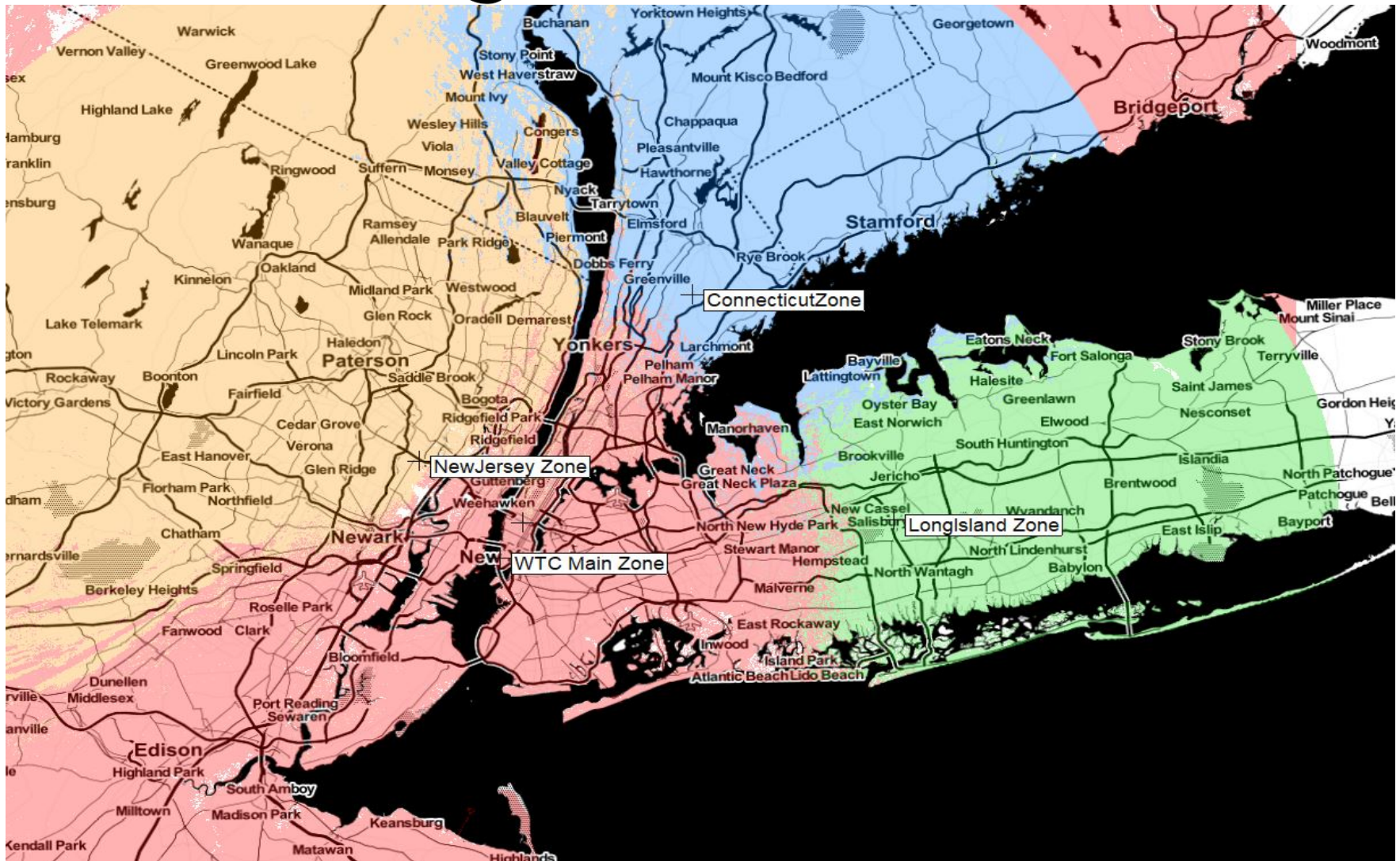
"You would listen to AM/FM radio more if the information/commercials were better targeted to your local area."

# ZoneCasting™

## Uses for Zonecasting

- Geo-Targeted advertising
- Geo Targeted traffic, weather, or news
- Geo Targeted political messaging
- Emergency information specific to targeted area
- Targeted alternate language programming
- Targeted programming to sporting event (stadium)

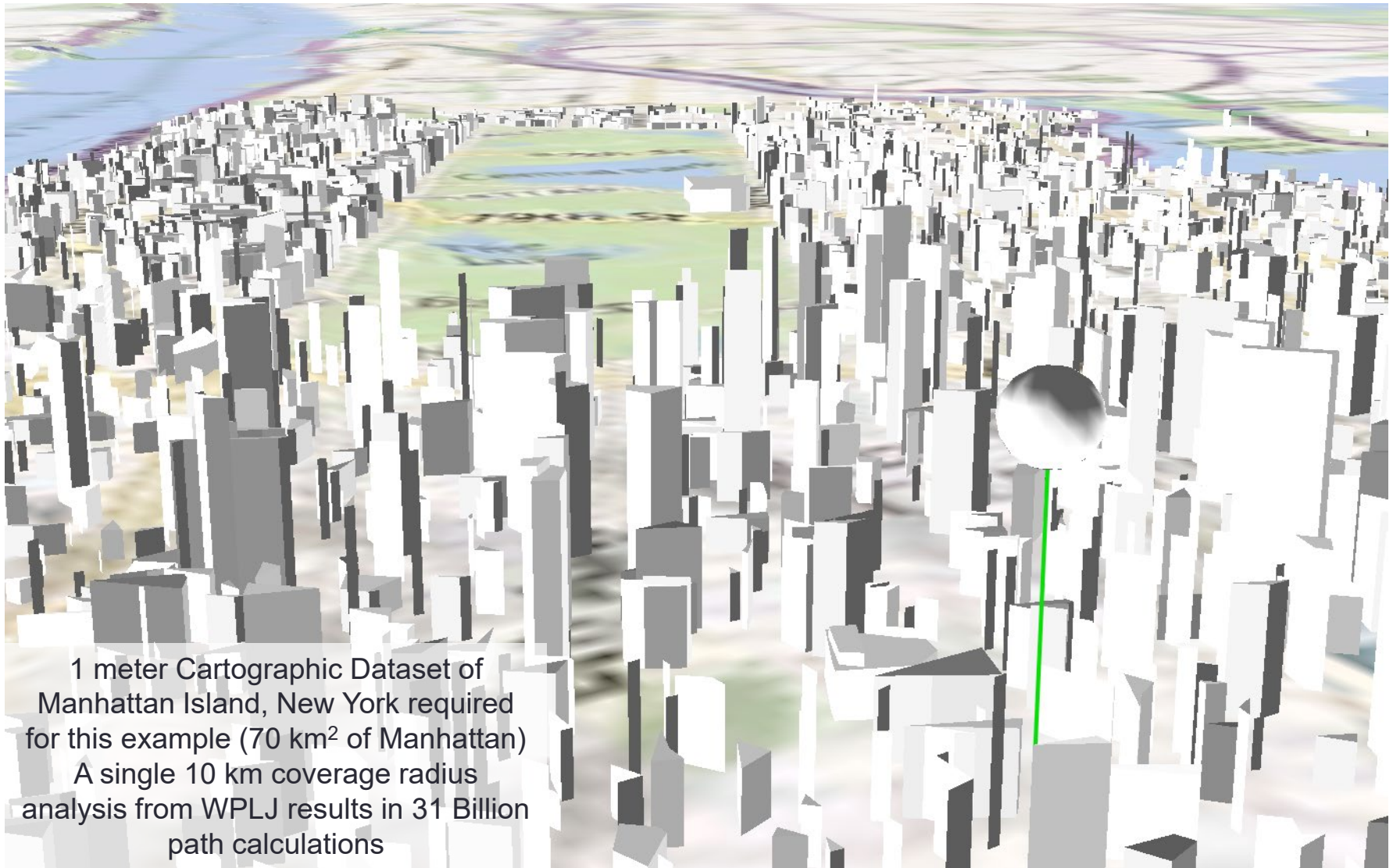
# ZoneCasting™ Concept- Zones New York



# Zone Creation Example- Manhattan

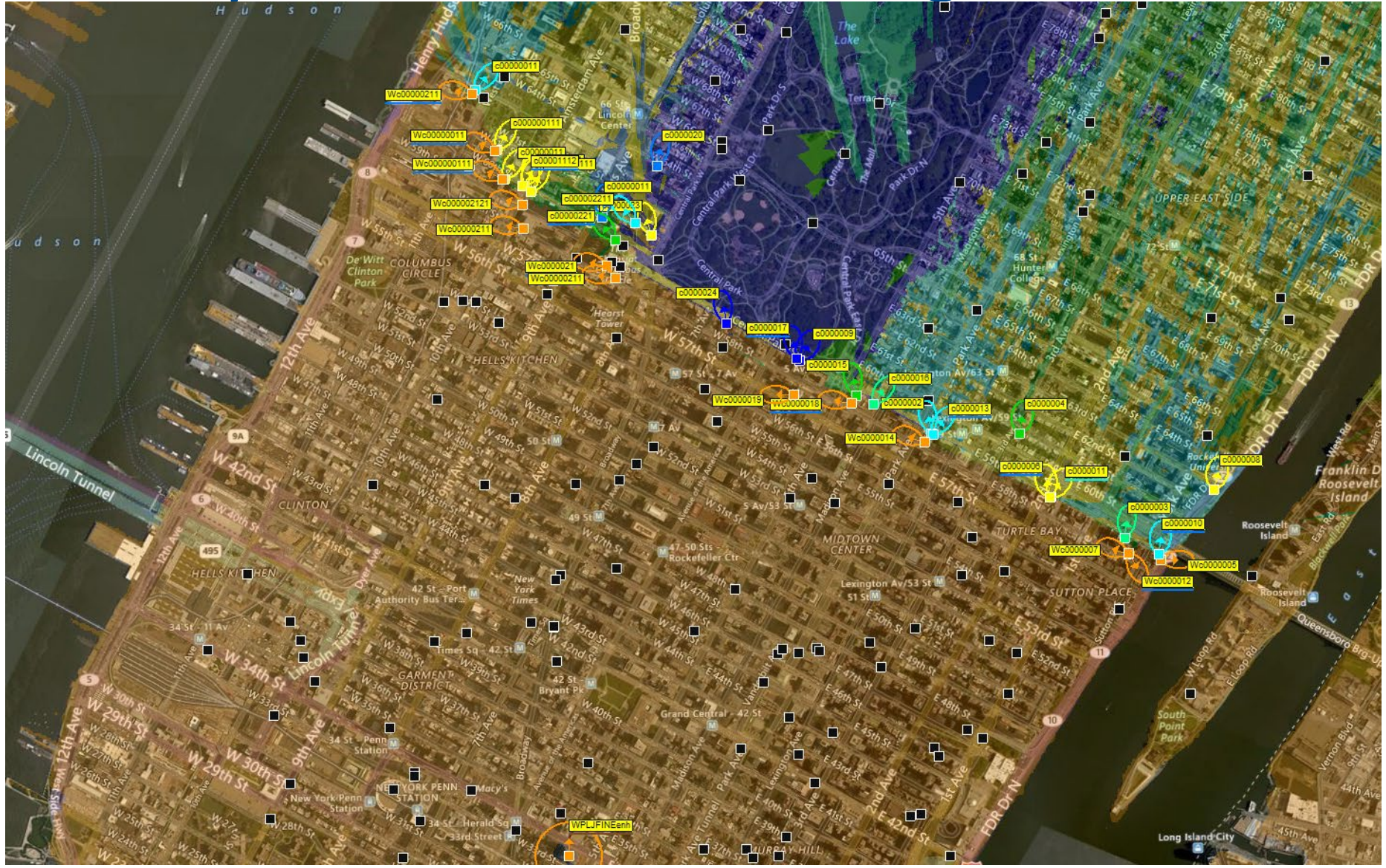
- To illustrate what “could” be done, a zone is created in Manhattan using WPLJ with small transition areas
  - Very difficult design situation with high height/power from main
  - Not meant to be practical, only Proof of Concept
- WPLJ (Empire State Building) is used
  - WPLJ Channel: 238B 95.5 MHz
  - Effective Radiated Power: 6.7 kW
  - Antenna Center HAG: 407 m
  - 3D High-Resolution Building Data (1 meter)

# Manhattan Cartographic Dataset 3D View



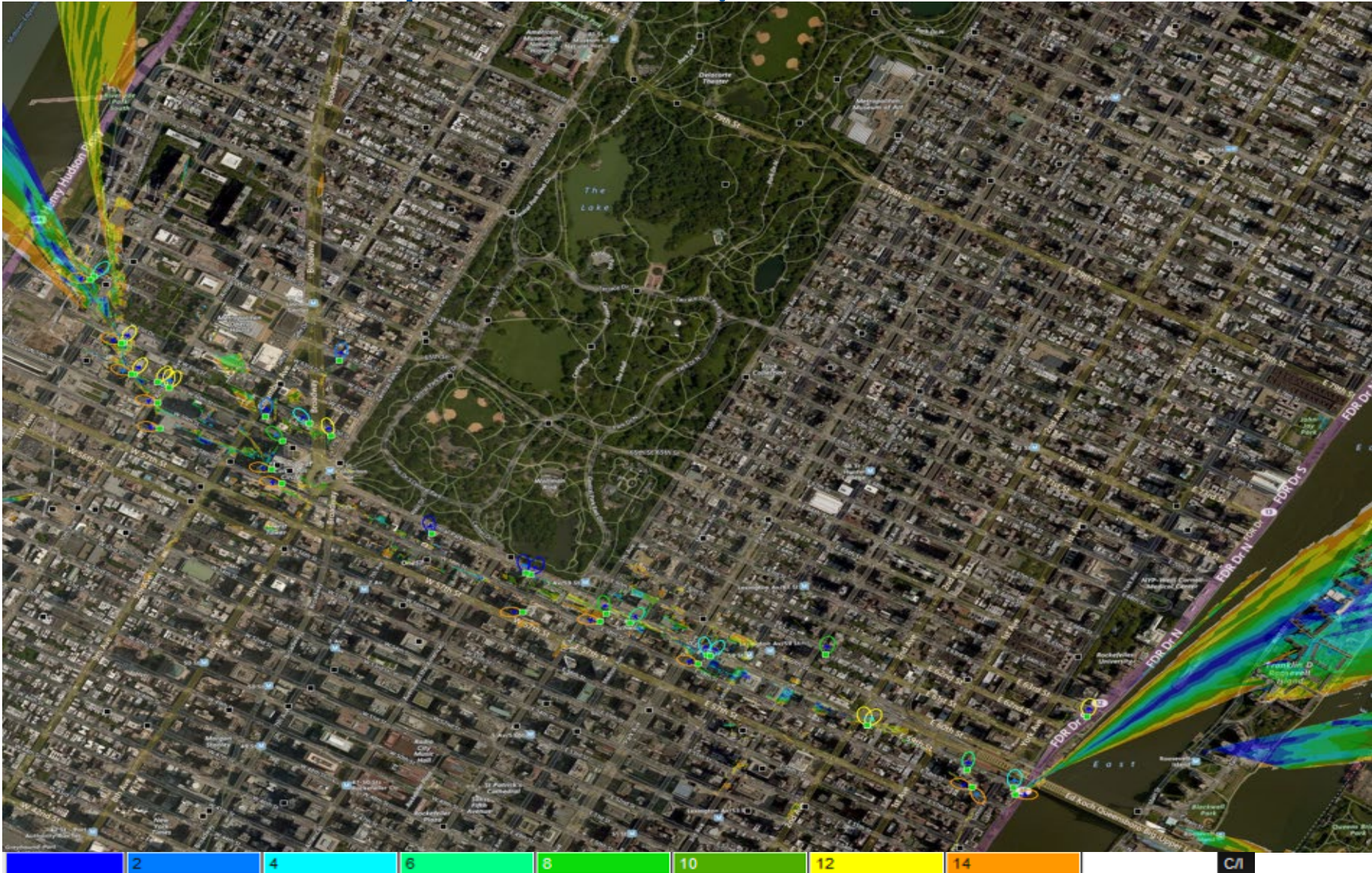
1 meter Cartographic Dataset of  
Manhattan Island, New York required  
for this example (70 km<sup>2</sup> of Manhattan)  
A single 10 km coverage radius  
analysis from WPLJ results in 31 Billion  
path calculations

# WPLJ split into 2 Zones along 59th St

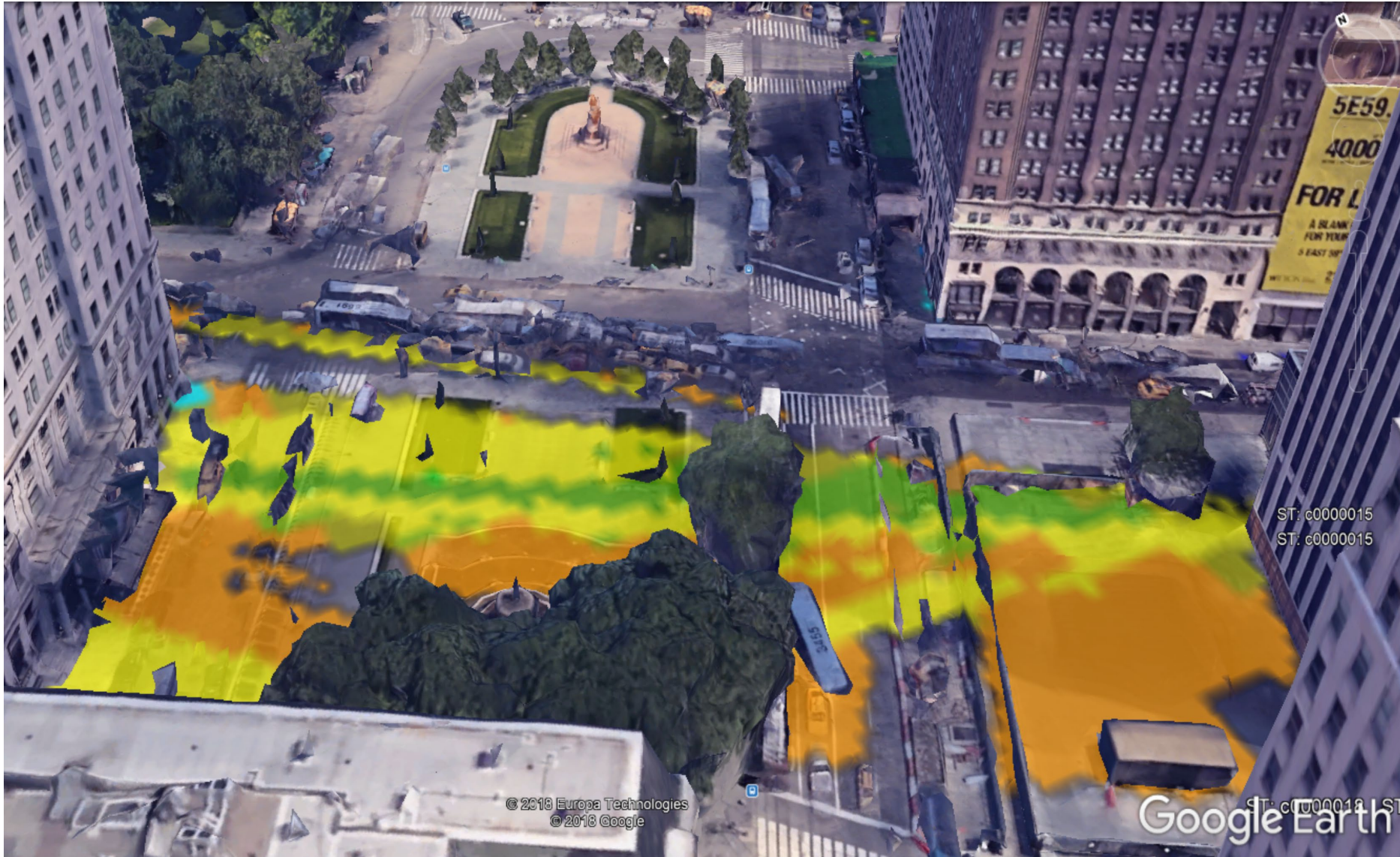




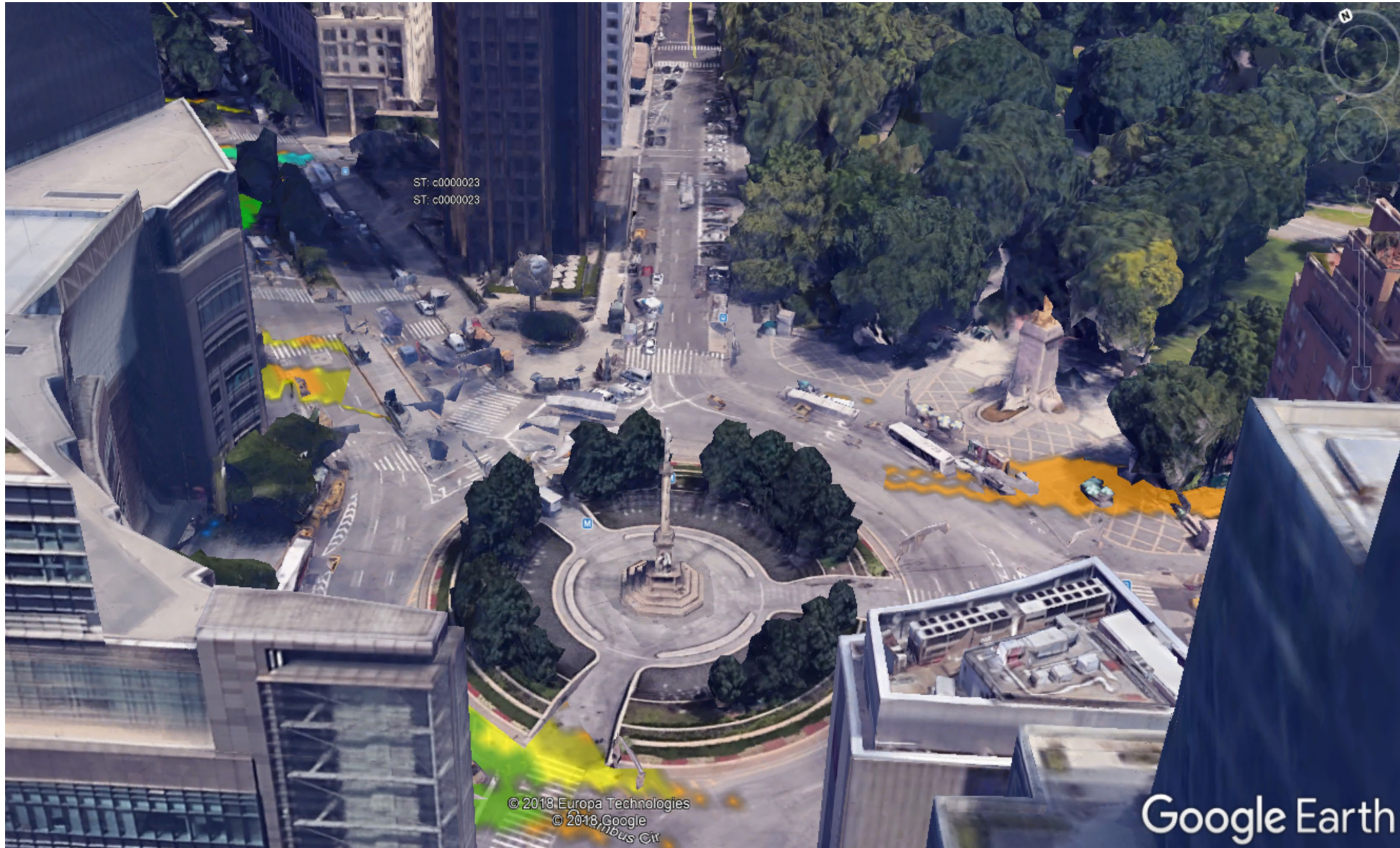
# Transition example 18 sites / 38 transmitters



# Transition example at The Plaza



# Transition example at Columbus Circle



# ZoneCasting™

## History

- GBS Performed 3 field tests under FCC special authorizations
  - In a variety of environments Salt Lake City (KDUT in 2010), Sebring, Florida (WWOJ in 2011), Milwaukee in (WIII in 2017)
  - Milwaukee design deployed and **commercially operational in France 2017**
- Technically patented and proven architecture
  - FM design parameters verified by NPR Labs & Towson University
- A very simple change in current FCC rules is needed [74.1231 (i)]
  - GBS has Petition for Rulemaking.

TV Can do zoned SFN now, more feasible under ATSC 3.0

# WIIL Milwaukee ZoneCasting™ Test 2017

4 Booster Cell Sites  
7 transmitters

Main Zone

East Zone



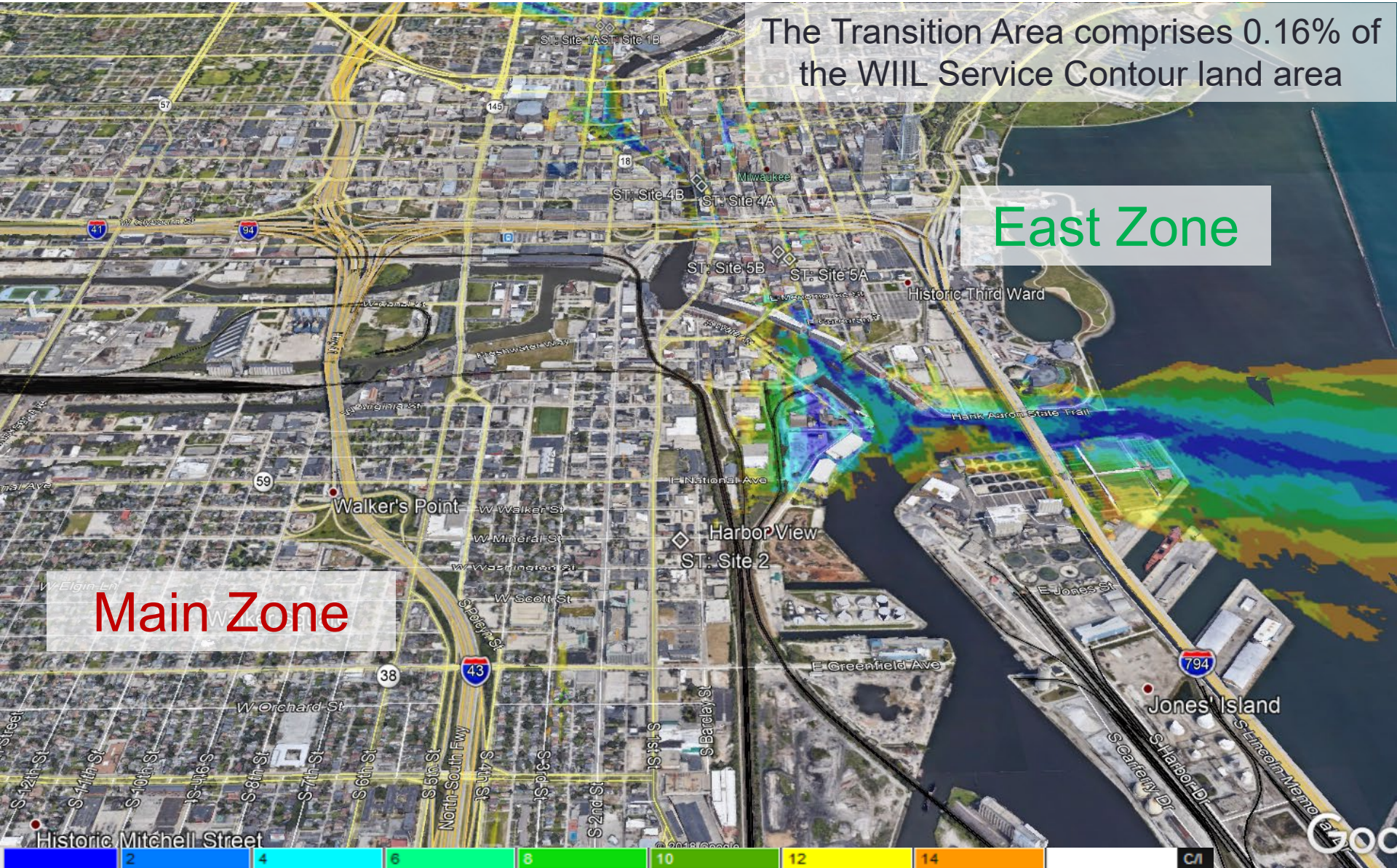
© 2018 Google  
© 2019 TerraMetrics

# WIIL Milwaukee ZoneCasting™ Test 2017

The Transition Area comprises 0.16% of the WIIL Service Contour land area

East Zone

Main Zone



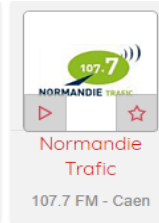
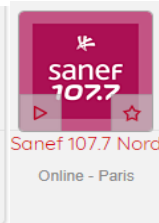
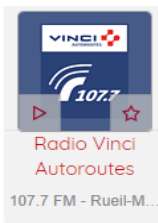
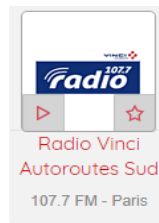
# ZoneCasting™

## Audio Transition Area

- Most asked technical question: How to avoid interference?
- IF a station is in ZoneCasting Geo-Targeted mode (predict avg 2-3 min per hour) AND
- IF a receiver is on that frequency AND
- IF that receiver passes thru the border between zones
- THEN
  - The audio changes from one sound source to another (quickly- in a few seconds)
  - Geo uses advanced cellular planning tools with very high resolution cartography (terrain, buildings, etc.) and automobile traffic information to minimize transition areas so listeners wont notice
- **Statistically under 1% of station listeners will hear transition from main to zoned area**
- Mobile TV using Next Gen Zoned SFN will have similar transitions

# The 107.7 in France

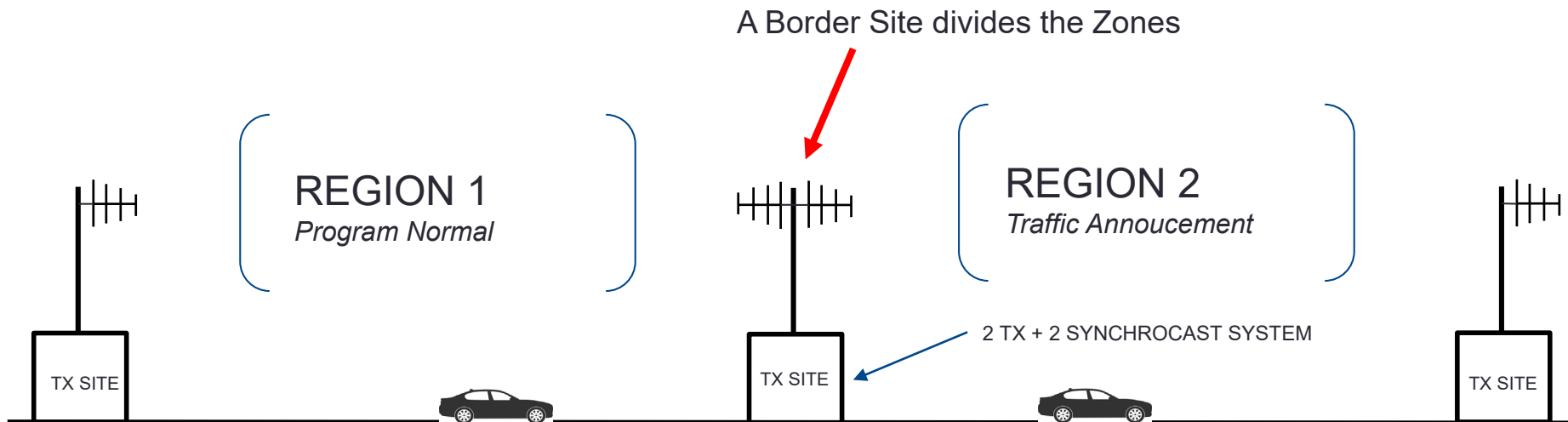
- 107.7 is the only single frequency assigned for the same program category. Reserved in the past to the Army, the government decided, in 1991, to release it to allow the radios highway of to develop.
- Each radio has its own identity, its own organization of traffic information and how to treat it. In addition, each gives more or less importance to the news of the road and drivers, the promotion of the territories they cross. Their musical program is not the same either.



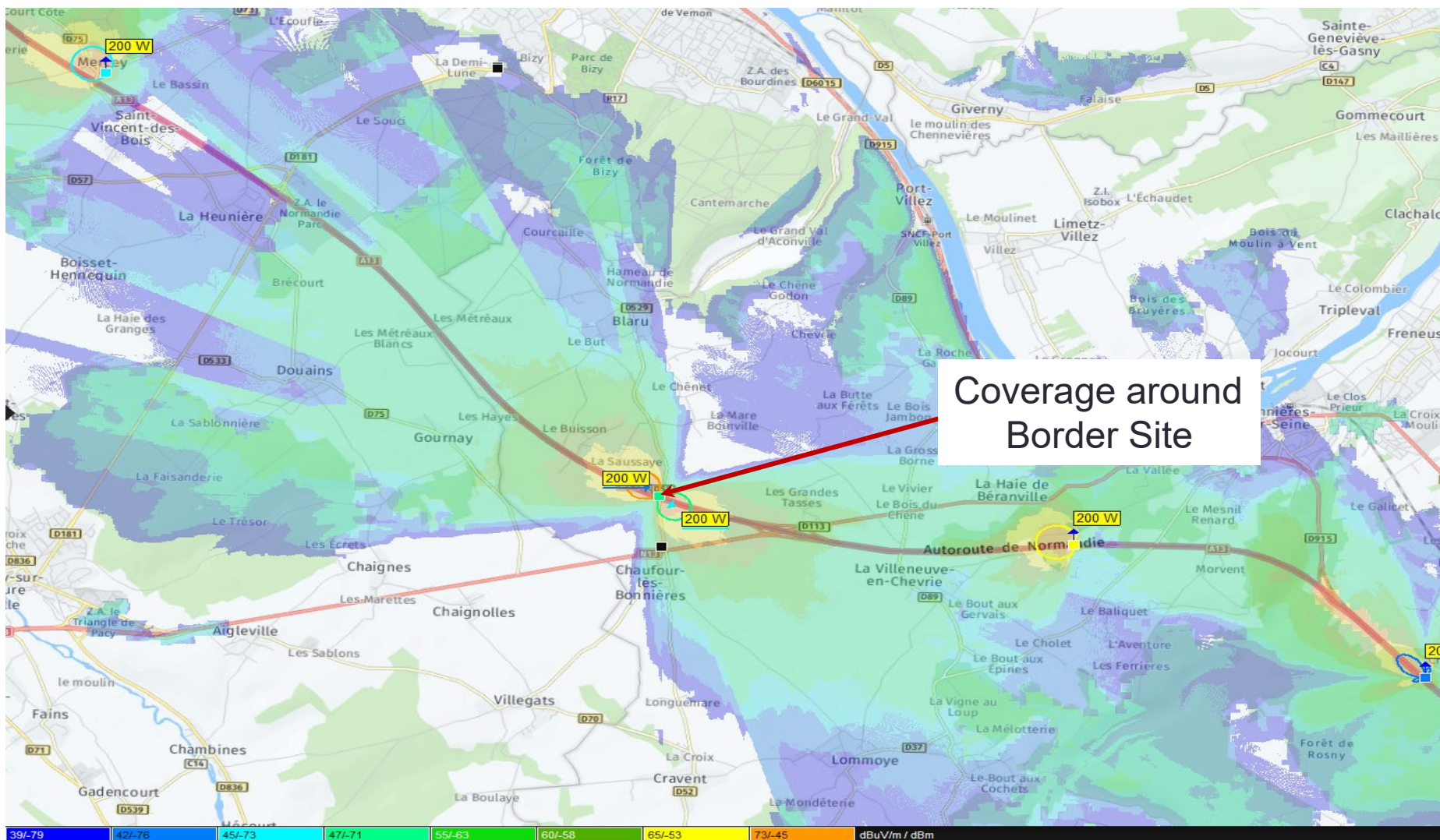


# The 107.7 in France

- the 107.7 MHz frequency is dedicated for Traffic and operated by different highway operators. When not broadcasting traffic it has music, news, and other programming that vary by region.
- Over 1,100 transmitters (one every 8-10 kilometers on average) are set up to broadcast the radio on a single frequency
- **Have started to Geo-Target Traffic audio updates using the Milwaukee ZoneCasting design in 2017**

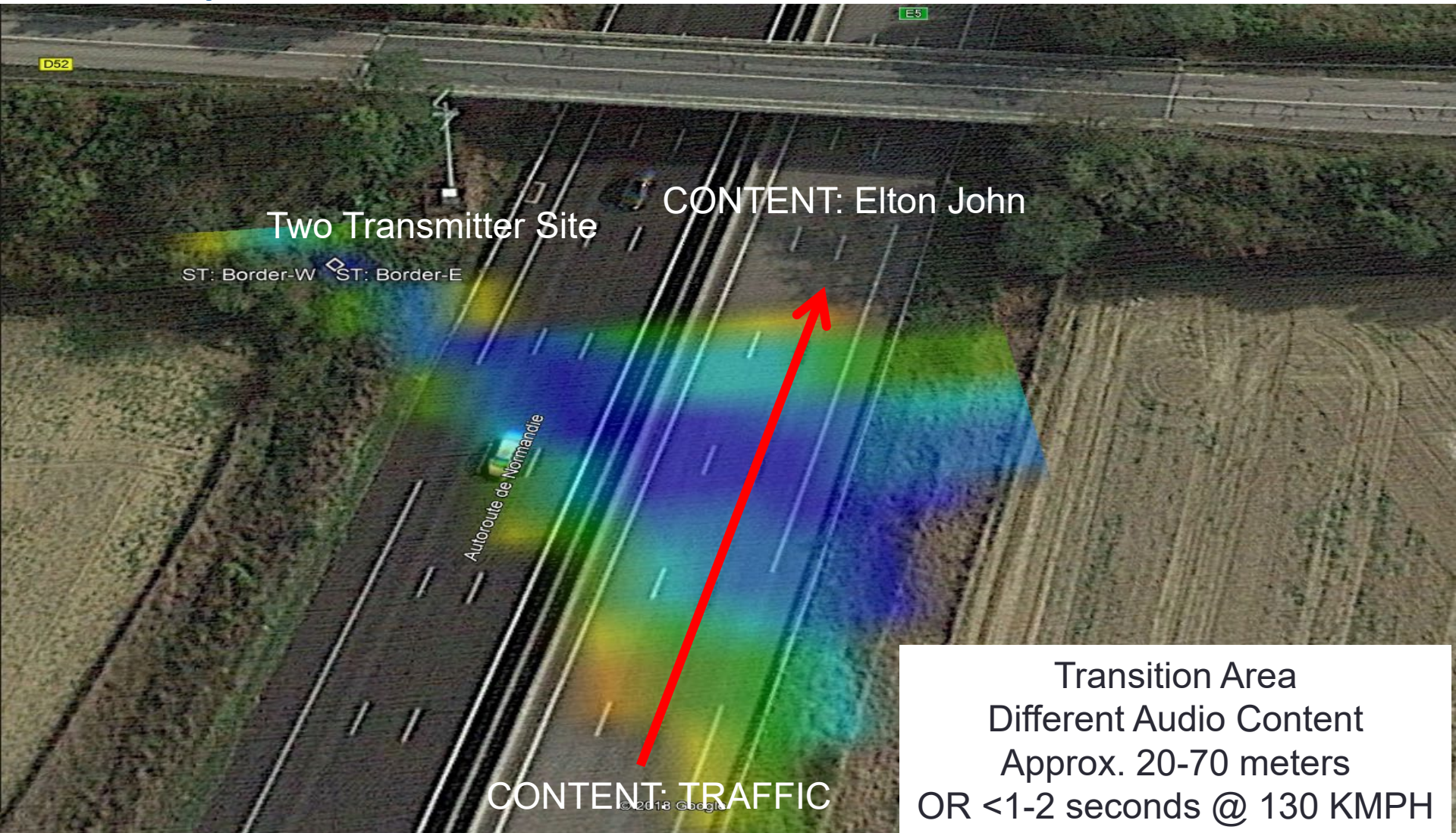


# Example: A13 Autoroute Paris to Caen



Coverage around  
Border Site

# Example: A13 Autoroute Paris to Caen



Transition Area  
 Different Audio Content  
 Approx. 20-70 meters  
 OR <1-2 seconds @ 130 KMPH



# ZoneCasting™ Buying / Traffic / Automation

- With ZoneCasting, stations can sell more inventory to (and with pricing flexibility) to smaller advertisers who cannot afford radio stations' full footprint but place a high value on the ability to geotarget. Zoned advertising gives local radio a new value proposition to better compete with cable, outdoor, newspaper and soon local TV stations.



# ZoneCasting™ Automation / Traffic Solution

## WIDEORBIT

WideOrbit Automation for Radio

WideOrbit 1 Main Zone **0:33** **AUTOMATIC** Time: 15:11:34 Status: Playing 080/000V

Simulcasting: \*16:30:00 Simulcast\* (2 followers connected)

**ON AIR** Doctor! Doctor! (16) 4:30 The Thompson Twins 16:35:59 080-000V

▶ 104 days of summer: Turn it up right now 0:05 TOMMY 16:40:29 LIN-000V

▶ Tempted (9) 3:44 Squeeze 16:40:35 80 080-0544

▶ Break the Safe 0:19 Tommy 16:44:19 PRO-001W

▶ Breakaway 0:00 16:50:00 Breakaway 16:44:38

▶ Stopset 0:00 Stopset 16:50:00

▶ Winterplace 0:59 Snow update 16:50:00

WideOrbit 1 - Today

Time	Title	Artist	Length	Media
00:00:00	New Hour		0:00	
00:00:00	Blasting Biggest Hits Legal ID	Station of the year	0:20	LIN-0016
00:00:21	Will You Still Love Me?	Chicago	5:33	080-003G
00:05:54	She Works Hard For The Mo...	Donna Summer	5:15	080-0009
00:09:59	Breakaway	00:10:00 Breakaway	0:00	
00:10:00	Stopset	Stopset	0:00	
00:10:00	Winterplace/	104	0:59	CM1-0107
00:10:59	Hudson's Bay/	105	0:29	CM1-0065
00:11:29	End Of Stopset		0:00	
00:11:29	Simulcast	00:10:00 Simulcast	0:00	
00:11:29	Things Can Only Get Better	Howard Jones	3:46	080-9048
00:15:16	Keep On Loving You	REO Speedwagon	3:16	080-6789
00:18:32	Heat Of The Moment	Asia	3:36	080-001M
00:22:09	J104.5 Slow shotgun #1		0:02	LIN-1330
00:22:11	Crush on You	The Jets	4:18	080-7471
00:26:30	Voice Track	WO Automation for Radio	0:10	VTK-0279
00:26:40	We've Saved the Best for Last	Kenny G	4:02	080-001X
00:29:59	J104.5 Fast Shotgun #2		0:06	LIN-1708
00:29:59	Breakaway	00:30:00 Breakaway	0:00	
00:30:00	Stopset	Stopset	0:00	
00:30:00	Bluefield Help Wanted/	108	0:59	CM1-0103

For 00:00 Total Actual Length = :58:43, Total Scheduled Length = :63:03

4:42 **AUTOMATIC** Zone 1 Time: 15:11:34 Status: Simulcasting... Output: - Next: 1

**ON AIR** Follower Simulcast 13:08 16:30:00 Stopset Simulcast 16:31:30

▶ Follower Breakaway 0:00 16:50:00 Stopset Breakaway 16:44:38

▶ Winterplace 0:59 Snow update 16:50:00 CM2-0107

4:42 **AUTOMATIC** Zone 2 Time: 15:11:34 Status: Simulcasting... Output: - Next: 1

**ON AIR** Follower Simulcast 13:08 16:30:00 Simulcast 16:31:30

▶ Follower Breakaway 0:00 16:50:00 Breakaway 16:44:38

▶ Follower Merge Point 0:00 Stopset 16:50:00

Menu WideOrbit 1 Delete Preview WideOrbit 1 WideOrbit 1 Library Hotkeys Audio Editor Voice Tracker WideOrbit 2 Hotkeys WideOrbit 3 Hotkeys

# ZoneCasting™ Multi Channel Traffic Solution For Next Gen TV Geotargeted SFN

WIDEORBIT

The screenshot displays the WideOrbit software interface. On the left, a 'Properties' window shows a list of call letters with columns for 'Call Letters', 'Close Date', and 'Main Phone'. The main window, titled 'Air Time Property - CBS 5', contains several sections:

- General:** Call Letters: WTV-MC, Name: CBS 5, Website: (empty), Sales Property: KPIX (SAN FRANCISCO), Affiliation: CBS, Property Group: TV, Property Type: Air Time.
- Phone Numbers:** Main: (415)675-6700, Billing: (empty).
- Accounting:** Includes sub-sections for Aging Alert, Logos, and Log Finalization Configuration.
- Default Order Channel:** <all>
- Table:** A table with columns: Type, Name, Master, Inventory Tree, Location, Re..., Active St..., A..., E...
 

Type	Name	Master	Inventory Tree	Location	Re...	Active St...	A...	E...
SB	SF	WTV-MC	TV-MC VS	1 01/29/19	181	SB		
SF	SF	WTV-MC	TV-MC VS	1 01/29/19	181	SF		
EB	SF	WTV-MC	TV-MC VS	1 01/29/19	181	EB		
SC	SF	WTV-MC	TV-MC VS	1 01/29/19	181	SC		
- Buttons:** New..., Edit..., Delete..., Show Deleted (checkbox).
- Footer:** 4 channels, Print..., OK, Cancel, Apply.

ording WOT ORBIT

# NAB and ATSC 3.0 FOCUSING ON AUTOS!

## ATSC 3.0 Trial Prepares For 'Car Of The Future'

By RBR-TVBR - October 16, 2018



MESA, ARIZ. — Television broadcasters working together to advance the launch of next-gen TV broadcasting, by way of the **ATSC 3.0** standard, are planning an early 2019 trial of the new standard's mobile video capabilities.

**avis budget group**

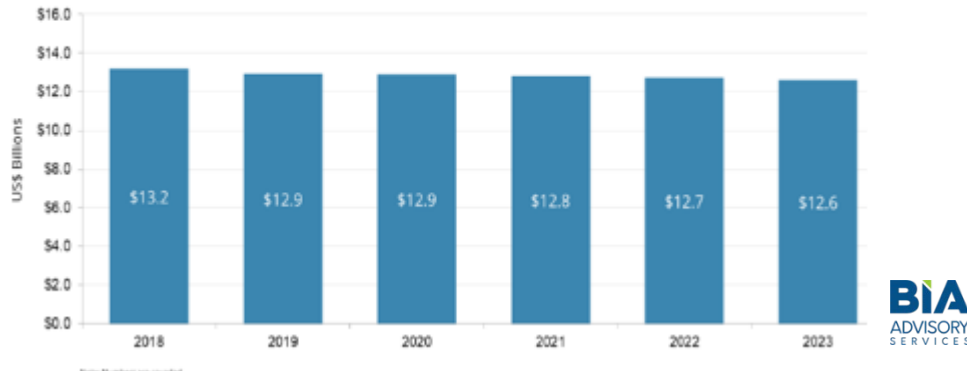
Who knew that one of the nation's biggest car rental companies will be "trying harder" to bring this trial to fruition?



ATSC 3.0 signals will be able to deliver software updates for electronic control systems and firmware downloads for navigation devices. **Geo-located applications will include real-time weather services and traffic reports, targeted emergency alerts, and targeted ads.**

# Radio Industry's Current Path- Declining!

Local Radio Over-the-Air Ad Forecast 2018-2023



- “Radio's revenue continues a slow decline through 2023.”
- “BIA's forecast model uses a variety of inputs but ultimately assumes no disruptive innovations will occur in local radio that could move the revenue needle in a material way. On the digital side, this means steady but slow growth in radio station and personality sites and apps but nothing particularly innovative.”
- Radio is the now the **ONLY** mass medium **WITHOUT** the ability to Geo-Target content

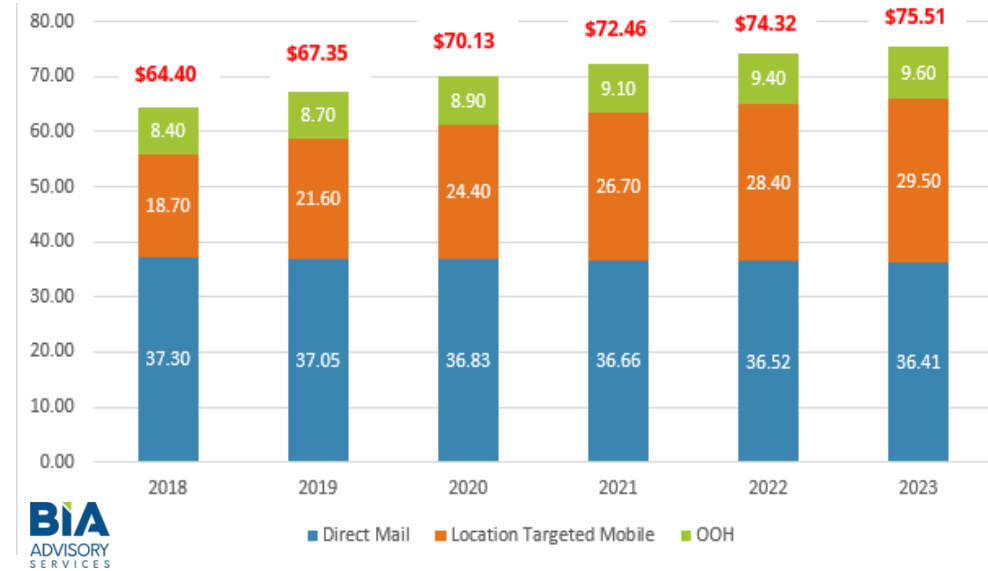


# ZoneCasting™

- Radio is missing out on the \$65 Billion Location Targeted Media segment
- ZoneCasting™ has regulatory awareness. The Broadcaster community is being educated and needs to support the cause

- One simple rule change: to permit booster radio sites to originate their own programming, separate from the main station [74.1231 (i)]
  - GBS has Petition for Rulemaking RM-11659; the FCC has not yet acted.
  - No changes or waiver to FCC's interference rules required, only program content
- ZoneCasting™ is like TV's new ATSC 3.0 for radio:
  - Voluntary deployment
  - Hyper-localized content to different areas in stations service contour

## Where Radio Can Go!



# ZoneCasting™

## Geo-Targeted Audio

### BIA Model for Industry Impact of Zoned Radio Advertising

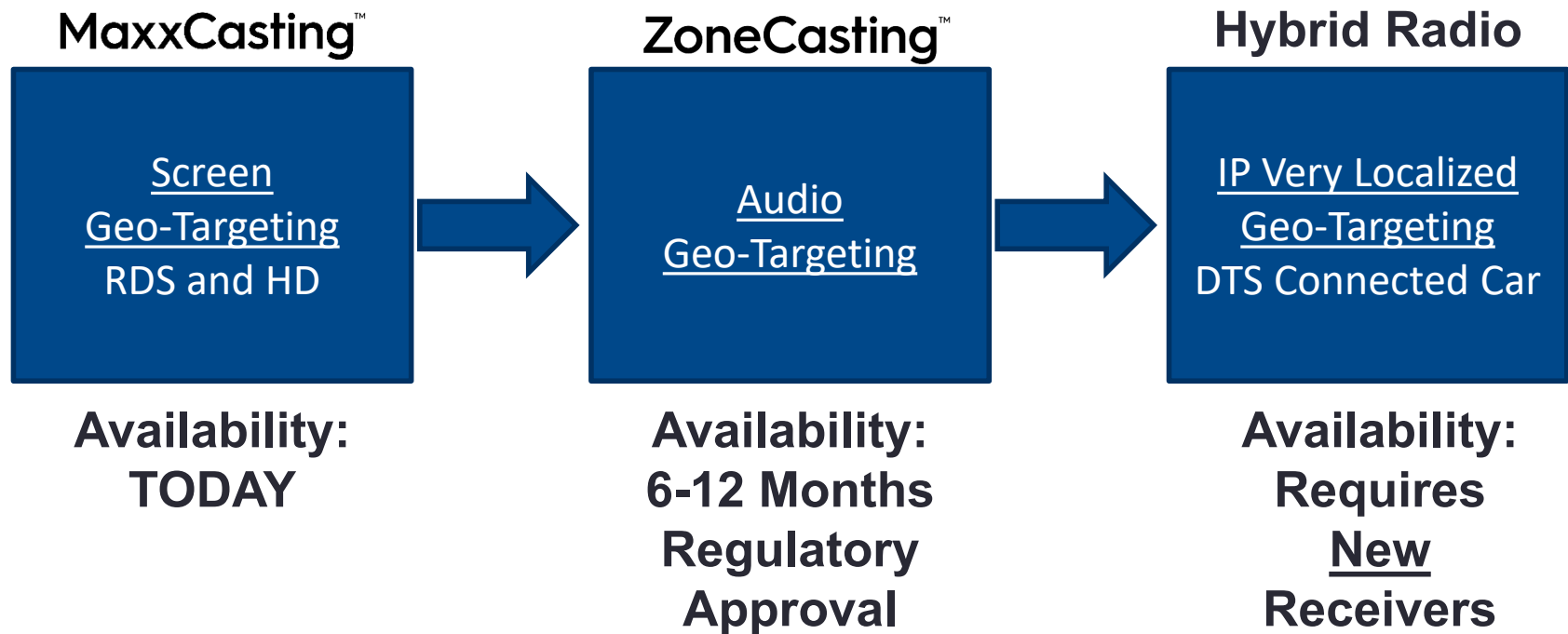
Model Parameters	Example
2017 Total Over-the-Air Adv. Revs. (000s)	\$6,603,425
% of Stations Zone Advertising in Multi-State/Multi CBSA Markets	35%
% of Market Revs. Attributable to the Zone Advertising Stations	70%
% of Stations Zone Advertising in Other Top 25 Ranked Markets	40%
% of Market Revs. Attributable to the Zone Advertising Stations in Other Top 25 Ranked Markets	80%
% of Spots that are Zone Advertised	30%
% Premium for Zone Advertising	50%
Additional Revenue (000s)	\$751,165

Source: BIA Advisory Services, November 2018

**Example Revenue model if Radio to Geo-Target with ZoneCasting**



# ZoneCasting™ Radio Geo-Targeting Evolution



# Comparison

## Zonecasting vs Next Gen (ATSC 3.0) SFN

	Zonecasting	Next Gen
Improves Coverage	YES	YES
Allows Geo-Targeted Advertising	YES	YES
Potential for Revenue Growth	YES	YES
Allows Geo-Targeted Emergency info	YES	YES
Use is entirely Voluntary	YES	YES
Transition Areas Between Zones	YES	YES
Billing, Traffic and Operational Ready	YES	YES
Allowed Under FCC Rules	<b>NO</b>	YES

FCC has embraced Geo-Targeted SFN For Television  
NOT FOR RADIO

# Call to Action for Geo-Targeting

- GeoBroadcast has retained legal firm Covington
  - ATSC 3.0 Regulatory Approval, Pearl TV
  - Supporting drafting of letters to the FCC
- Ongoing Dialog with the Chairman's office, Media Bureau, and NAB
- GeoBroadcast in process of aggregating support of broadcasters, advertisers, legislators to advance message with the FCC and garner support for minor rule change
- Objective to give Radio equality with TV on Geo-Targeting capability
- Further info on FCC PRM or how you can help, contact [hwells@geobroadcastsolutions.com](mailto:hwells@geobroadcastsolutions.com)



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THANK YOU