

DOCKETED

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Broadcast-Based Communication System to Facilitate Optimized Load Management

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Background

- ▶ Currently, **less than 1%** of electrical consuming devices have real time energy grid information
- ▶ Since early 1900's radio broadcasting has been informing human listeners with **trusted audio information**
- ▶ Broadcasting is still the most efficient method to disseminate info to infinite numbers of human and **device** listeners virtually instantly
- ▶ Analog and digital radio is **easy to install** (just power it up), **it scales rapidly**, and is **secure** and **private**
- ▶ Radio listens and does **not** talk. Think road traffic advice with voluntary driver response

Want to Scale? Use existing FM Radio infrastructure

- ▶ There are 10,000 FM stations in the US that cover 99%+ of the population (urban and rural)

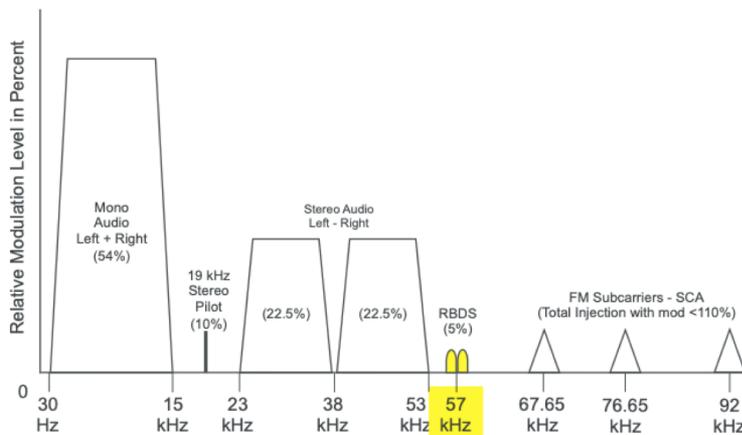


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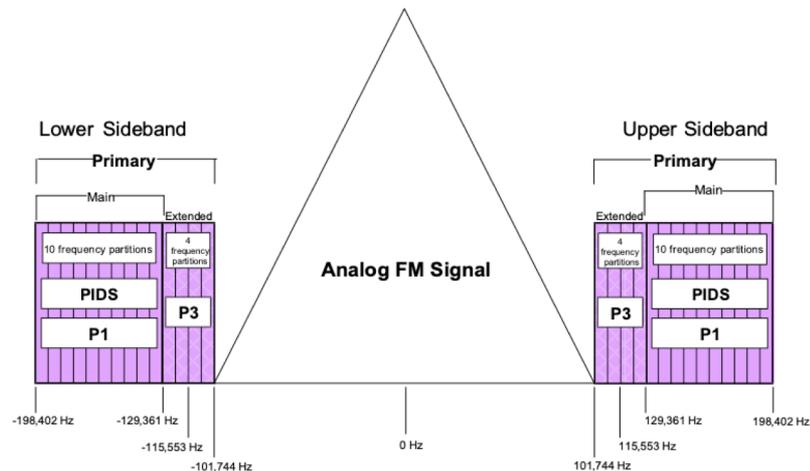
Want to Scale? Use existing FM Radio infrastructure

- ▶ FM Broadcast Technology is global with the additional capability of digital carriers like Radio Data Systems (RDS/RBDS) & HD Radio ®

FM Spectral Landscape



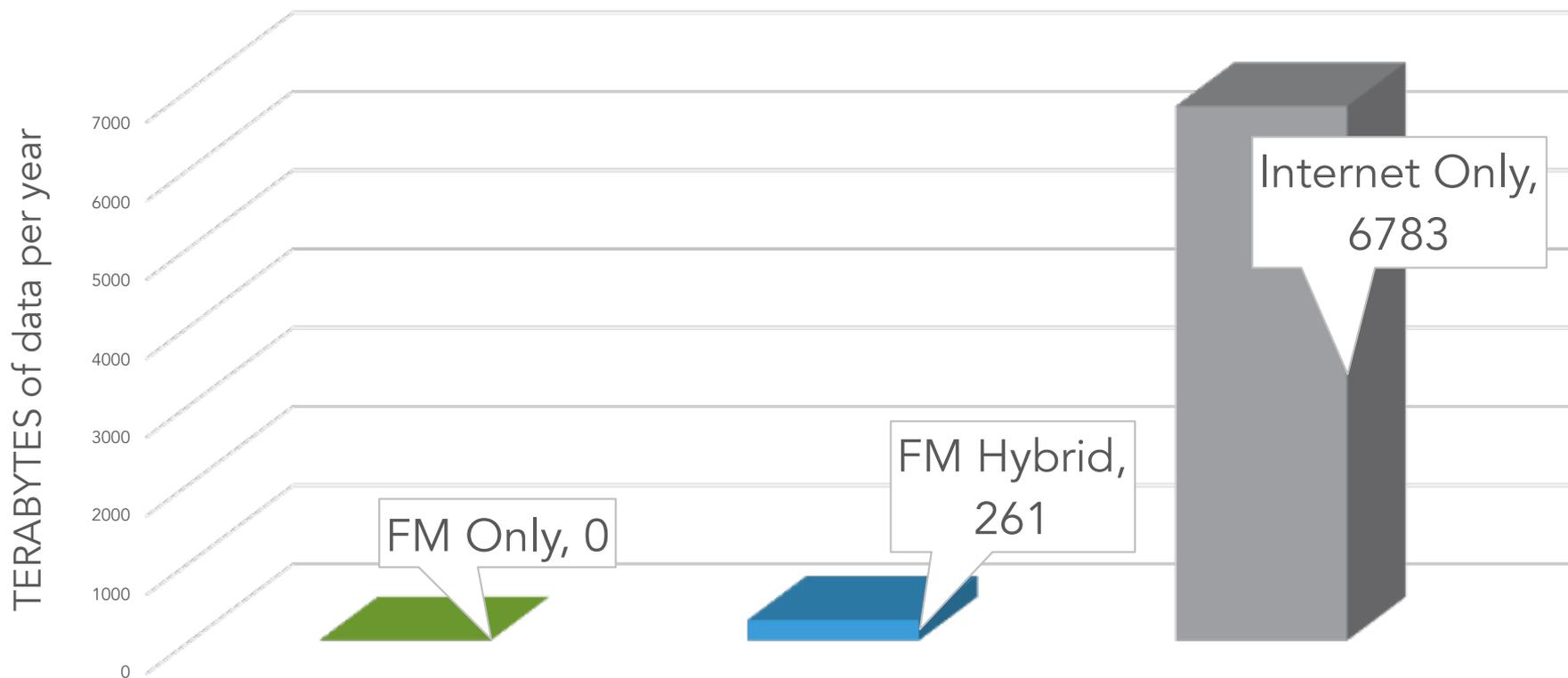
FM Extended Hybrid Mode



e-Radio Broadcast Communications Characteristics

- ▶ Point to infinite points broadcast to wide coverage areas while still allowing location specific capabilities
- ▶ Does not **require** a meter, home network or internet connection, but can be used with them in parallel
- ▶ Broadcast receivers **can** be paired with Wi-Fi or cellular to **decrease and optimize** their two-way data use
- ▶ Can be used in combination with **OpenADR**
(open approach: <https://www.osti.gov/biblio/1164902>)

Comparing California Device Data Traffic (*TERABYTES* per year)



2008 SMUD project

- ▶ e-Radio enabled Radio Data Systems (RDS) on local Sacramento FM radio stations for this project:
- ▶ Small Business Demand Response with Communicating Thermostats: SMUD's Summer Solutions Research Pilot

*"This study provides California State policy makers assurance that dynamic rates and load control programs can be used concurrently and effectively in the small business sector. This study also informs California State energy agencies that it is possible to use **Radio Data System** communications technology to **broadcast** system alerts to the mass market in support of dynamic rates, demand response programs, and utility service messages – even in the event of a power outage." [bold emphasis added]*

(see LBNL/DOE project <https://www.osti.gov/biblio/974442>)

2015-2018 BPA project

- ▶ e-Radio enabled FM stations in the PNW covering 8 BPA utility markets
- ▶ Hundreds of water heaters using CTA 2045 modules respond to real time grid info
- ▶ The project was a technical success and WA state legislation followed
- ▶ Research work now continues with HVAC heat pumps using the same CTA 2045 hardware and software

Thank you.

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