



Hybrid for Automotive

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[@RadioDNS](https://twitter.com/RadioDNS)

A tall, slender radio transmitter tower stands on a grassy hill. A dirt path leads up to the base of the tower. The landscape is green with some yellow wildflowers. The sky is clear and blue.

Broadcast

Mass-market

Economic coverage

Reliable

Free-to-air

Few enhanced services

No interaction

Transmitter in Bournemouth, England: (cc) James Cridland





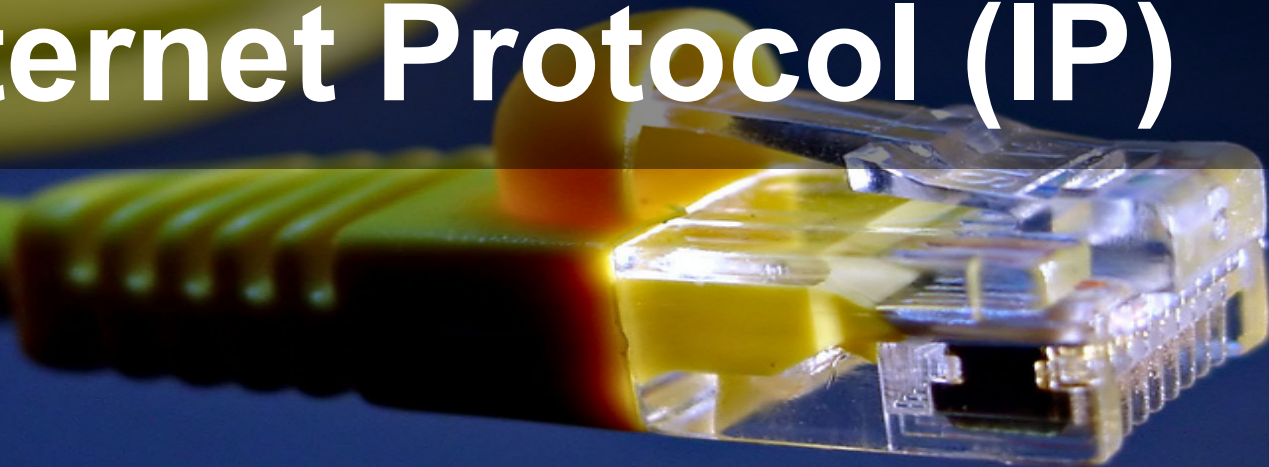
Minimal Data



Digital Broadcasting



Internet Protocol (IP)



Enter the location that you wish to search for (eg Postcode, Town or Street)

brockley

Search

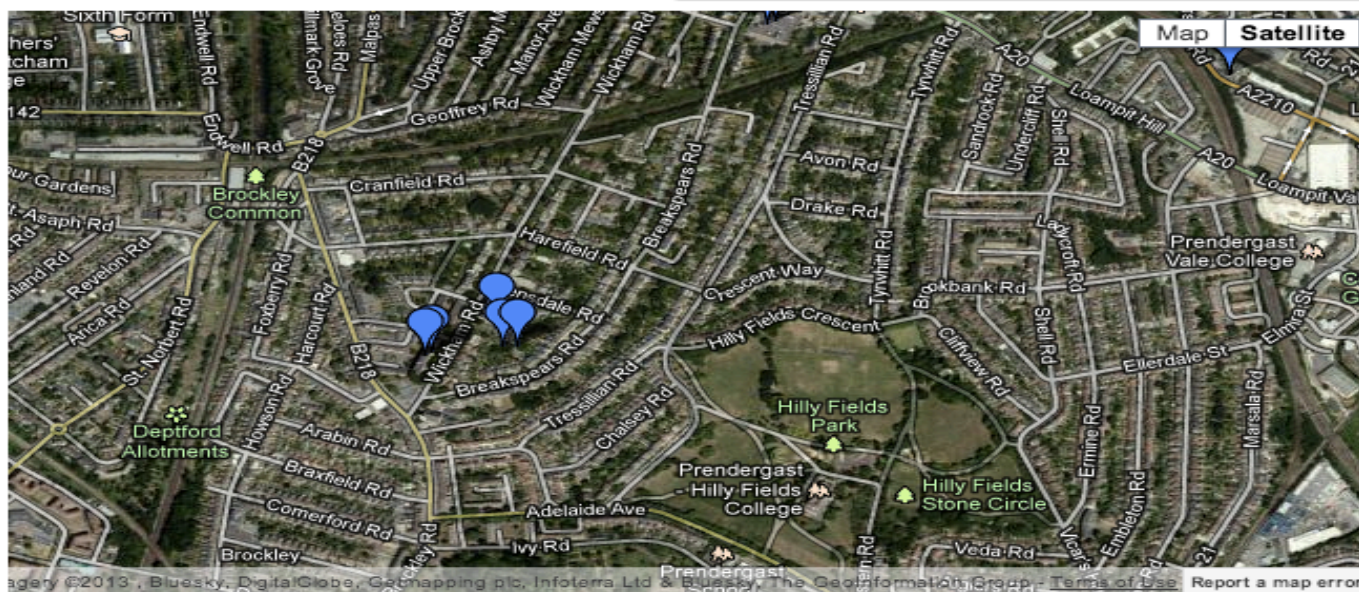
1 radio transmitter found at this map location.

Brockley, London Borough of Lewisham, London SE4, UK

Name of Operator	3
Operator Site Ref.	SE0407
Station Type	Macrocell
Height of Antenna	30 Metres
Frequency Range	2100 MHz
Transmitter Power	25.85 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

Click [here](#) to send an enquiry concerning this mobile phone base station to the operator.

Close



Single Operator GSM
technology

Single Operator UMTS
technology

Single Operator TETRA
technology

Base stations with more
than one operator or
more than one
technology

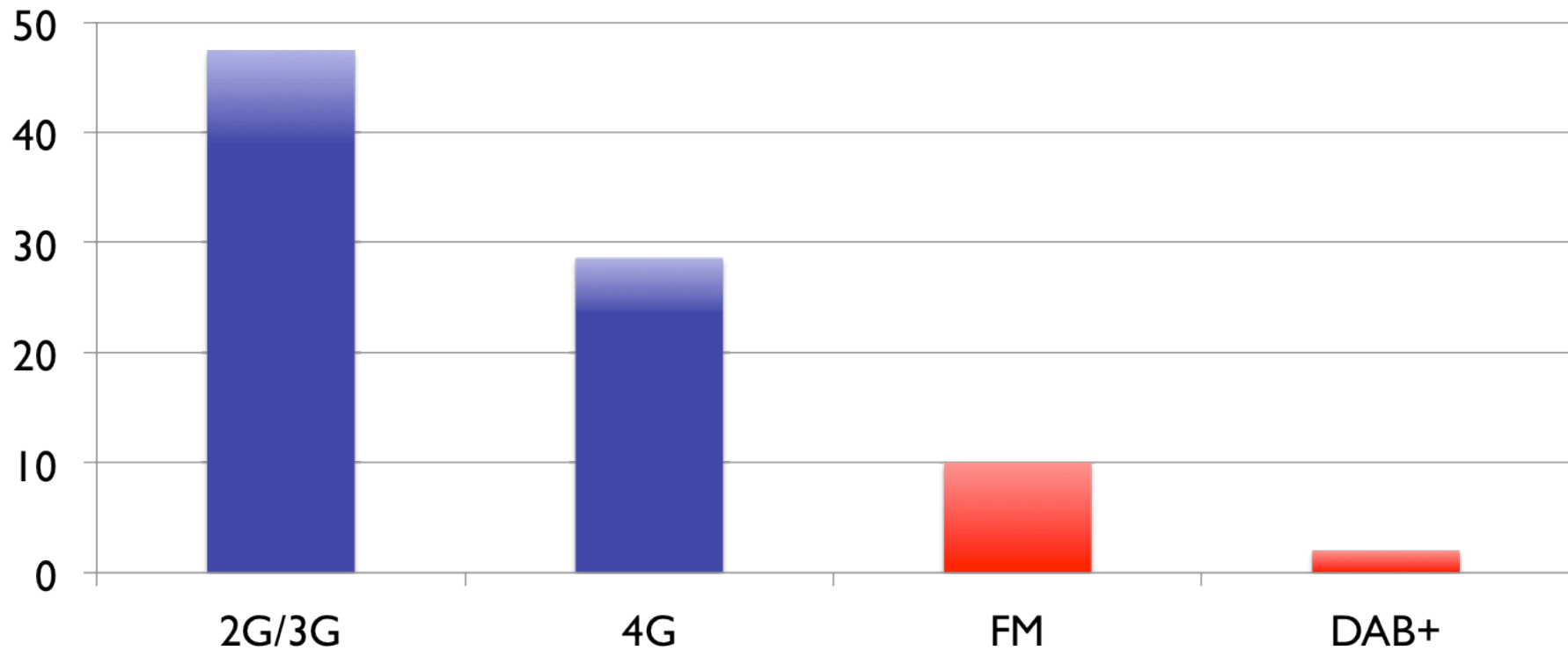
0

2

0

9

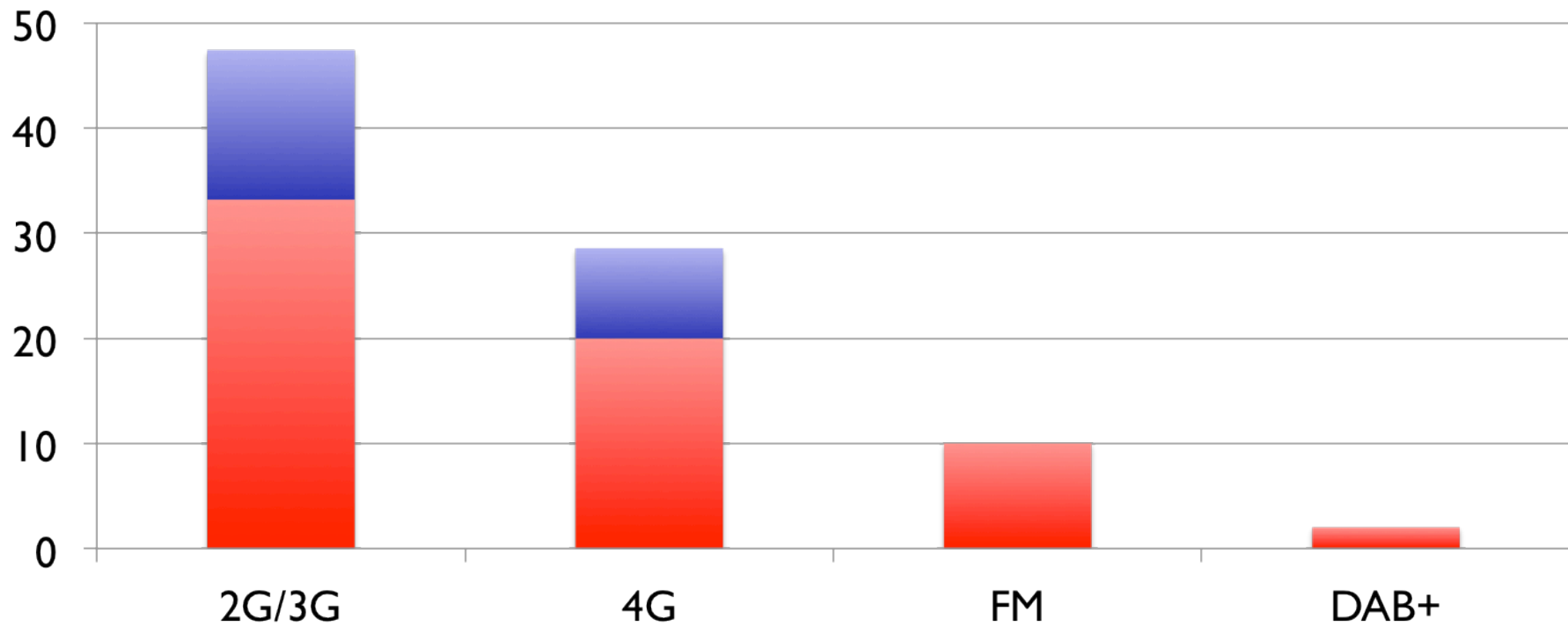
Spectrum Allocation



Peak Radio Listening

- 30% of adults listen **simultaneously** around 08:00
- **Crowded** environments – commuter trains, cars in traffic, people on buses, people walking to work
- Radio streaming - ~60kbit/s per person
- **Realistic** Mobile IP information density – 1.3bit/s/Hz

Spectrum Efficiency



Hybrid Radio

Combining Broadcast & IP

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Hybrid Radio

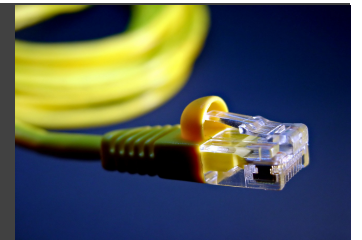


Broadcast works for the mass market

Low Cost, Ubiquitous, Free, Reliable

The Internet adds targeted value

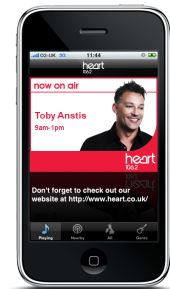
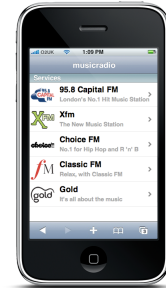
Enhanced content, Personalisation and Transactions



Devices

Distribution

Experience



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Radio



Capital

Now: The Bassman

Next: Greg Burns



Classic fm

Now: Jamie Crick

Next: Classic fm Drive



Heart

Now: Nick Snaith

Next: Tim Lichfield



LBC

Now: Julia Hartley-Brewer

Next: James Whale



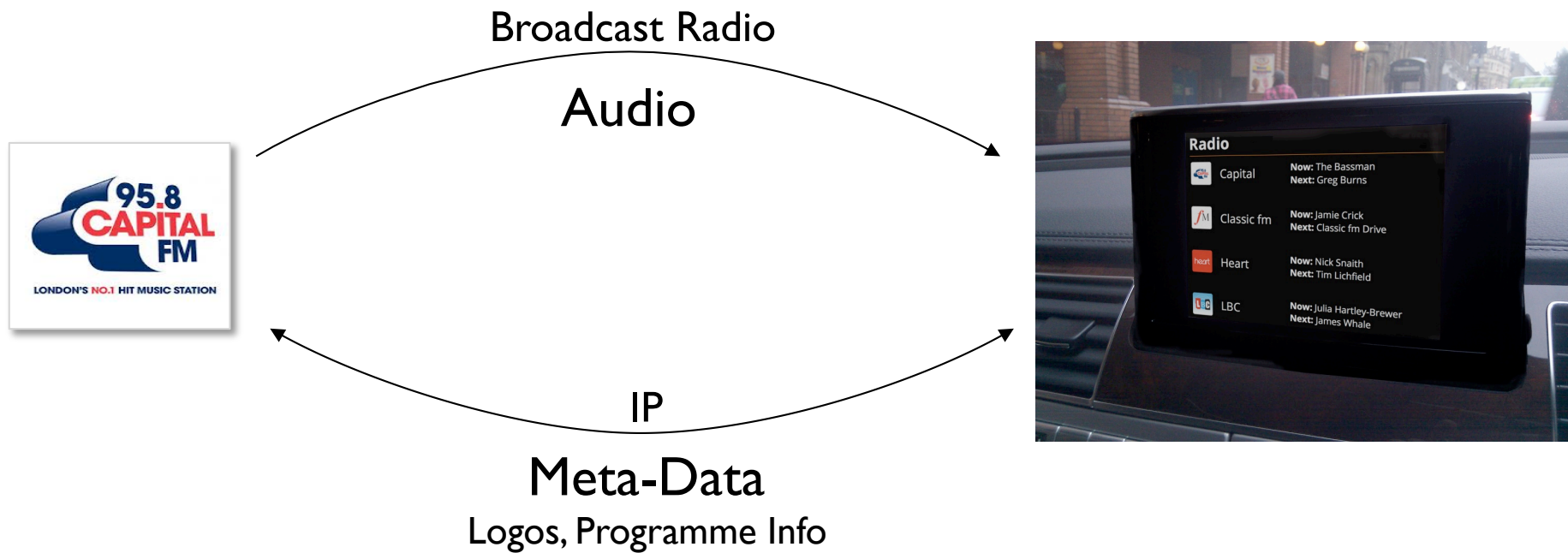
Delivered over
broadcast

Delivered
over IP



THE UK'S **NO.1** HIT MUSIC STATION

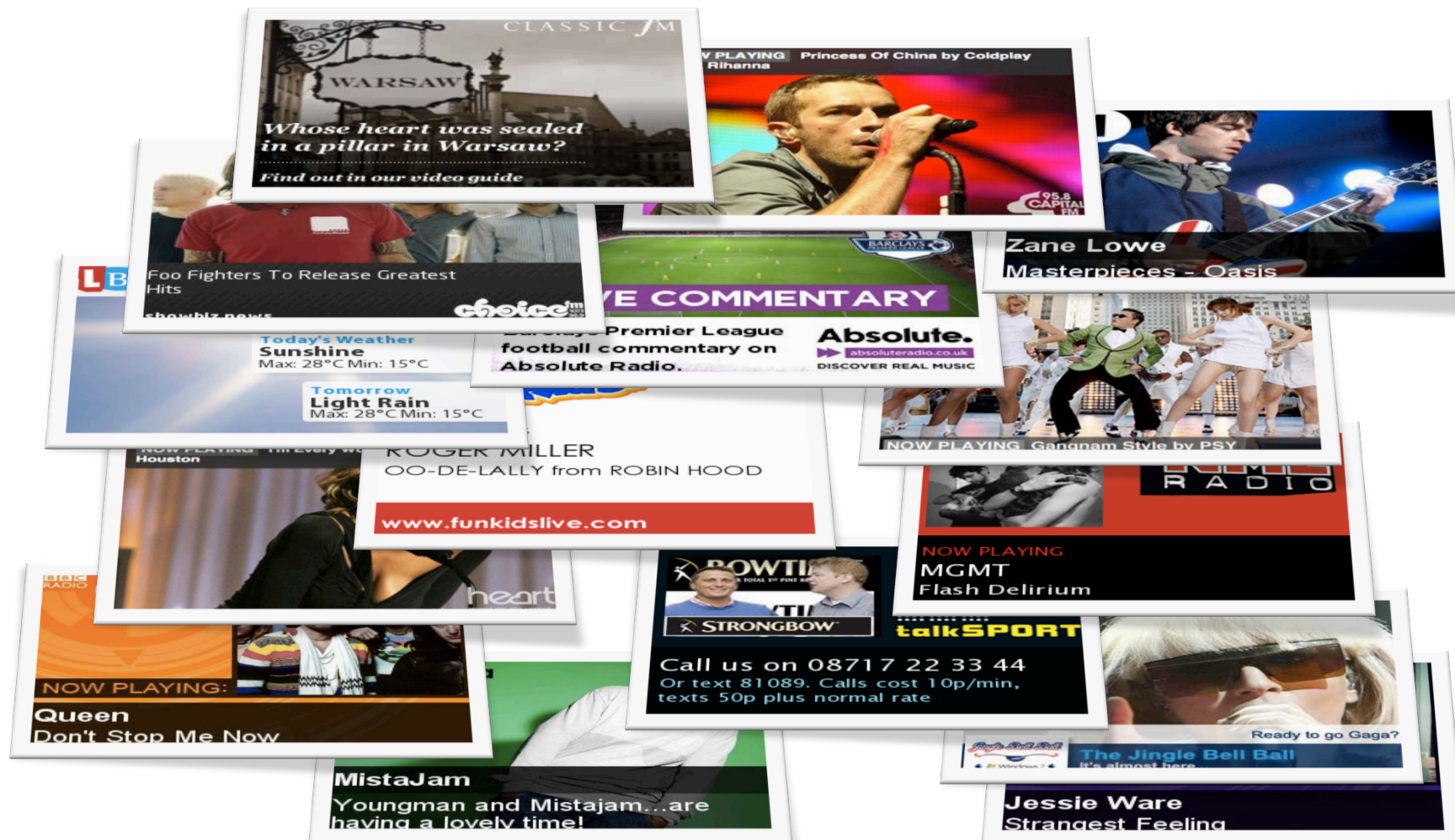
Hybrid Delivery



Visualised Radio

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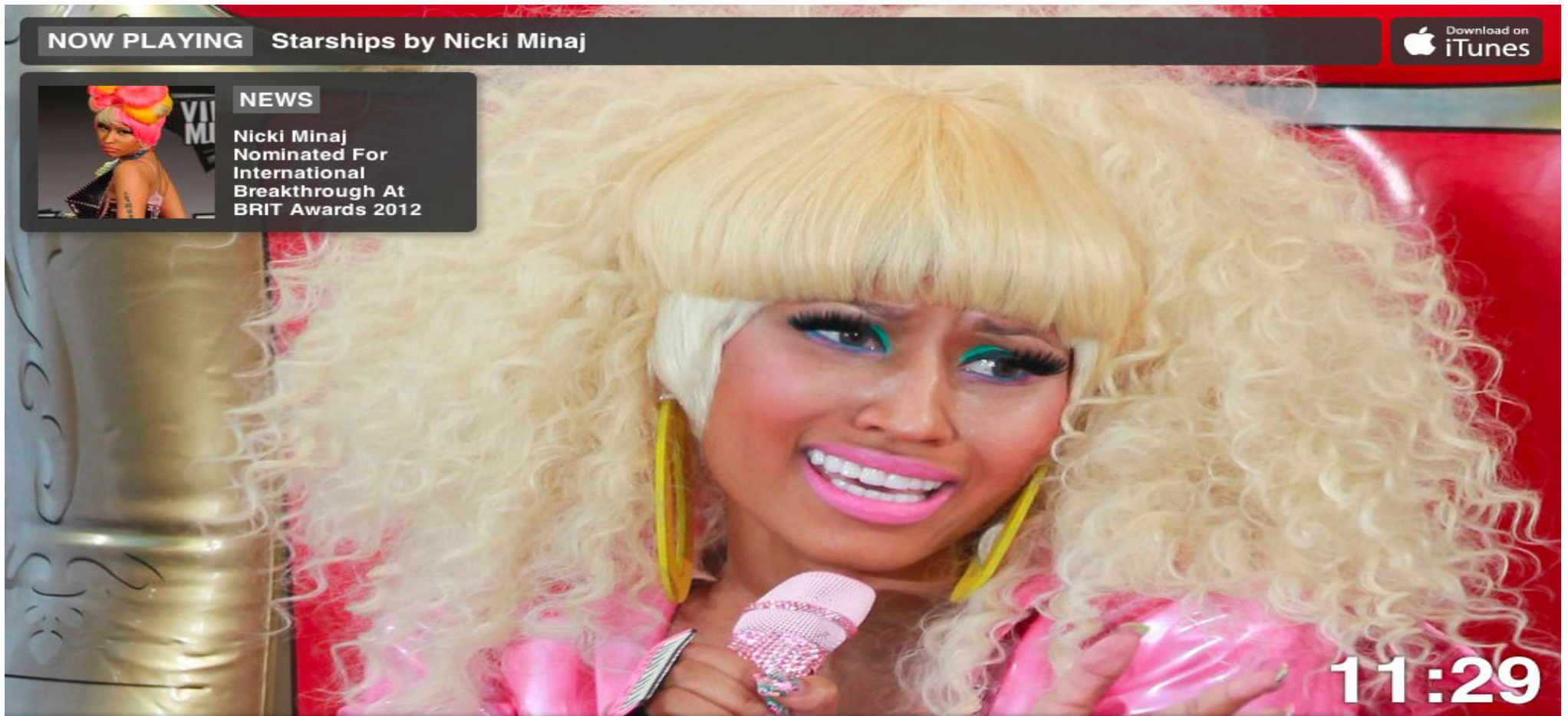
NOW PLAYING Starships by Nicki Minaj

Download on
iTunes



NEWS


Nicki Minaj
Nominated For
International
Breakthrough At
BRIT Awards 2012



11:29

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 **NOW PLAYING**

**ED SHEERAN -
Lego House**

95-106
**CAPITAL
FM**

On air now
The Bassman
1pm-4pm





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RadioDNS Demo



- Based on a current production radio
- Implements RadioDNS functionality with the help of a smart phone
- Broadcast data is transmitted via Bluetooth to the phone
- Possible solution for a wide range of receivers

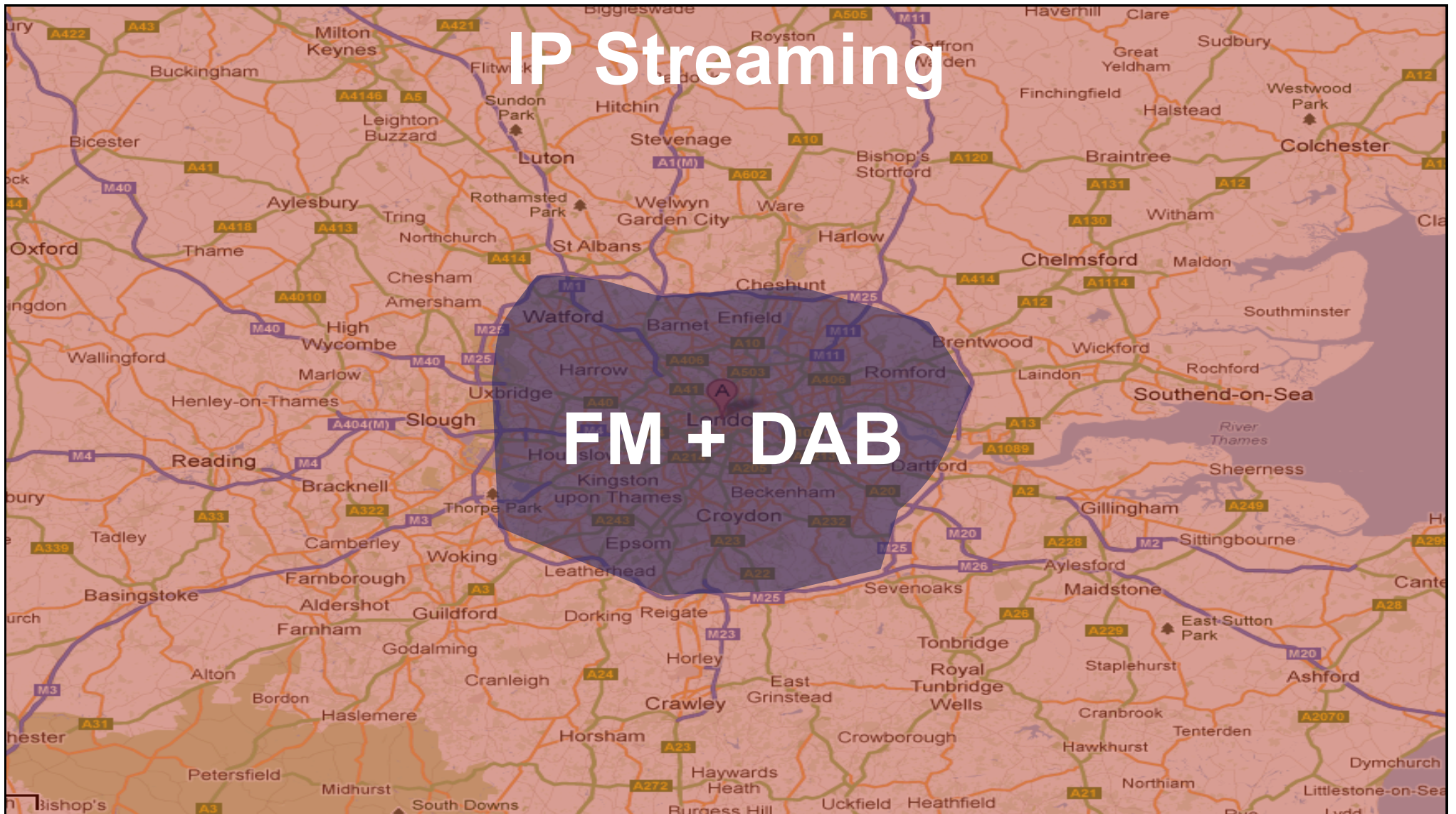


Service Following

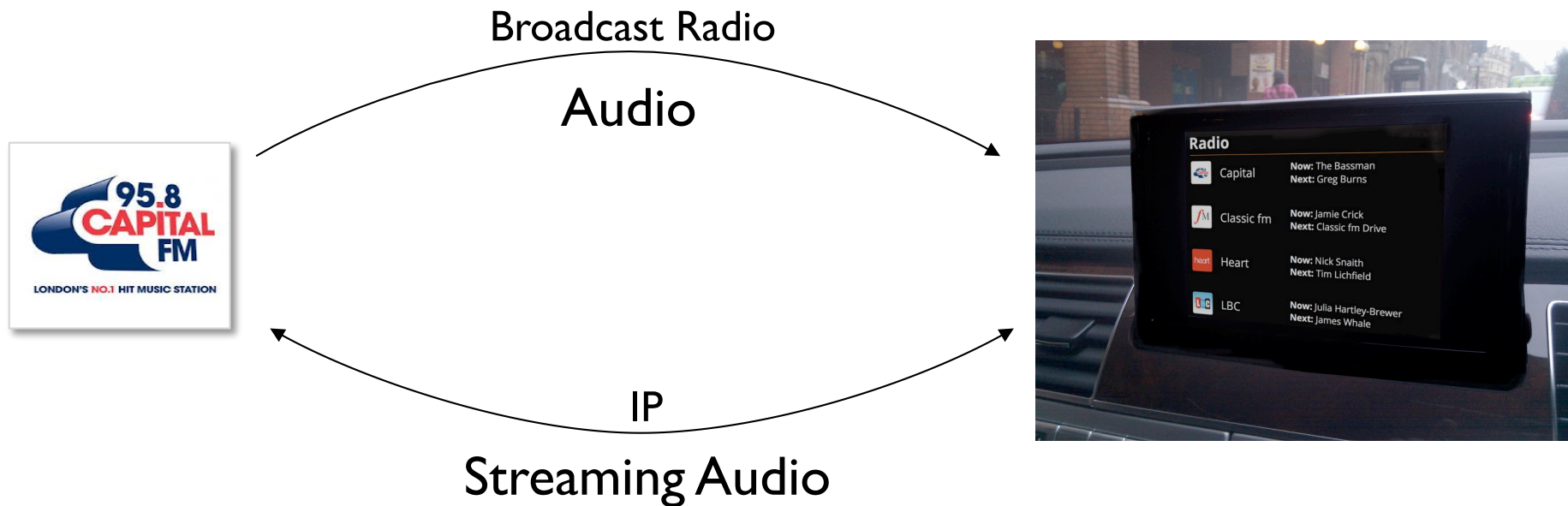
Switching between broadcast and streaming

IP Streaming

FM + DAB

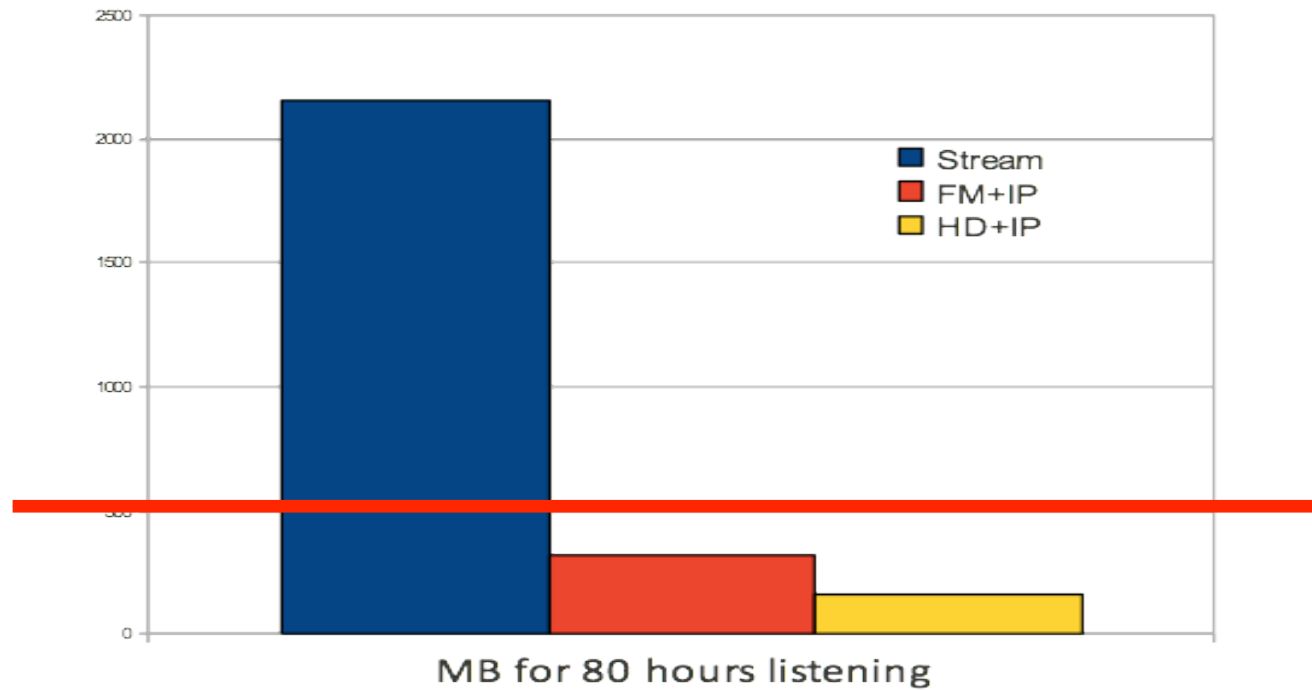


How It Works



Only use streaming when the broadcast signal is weak

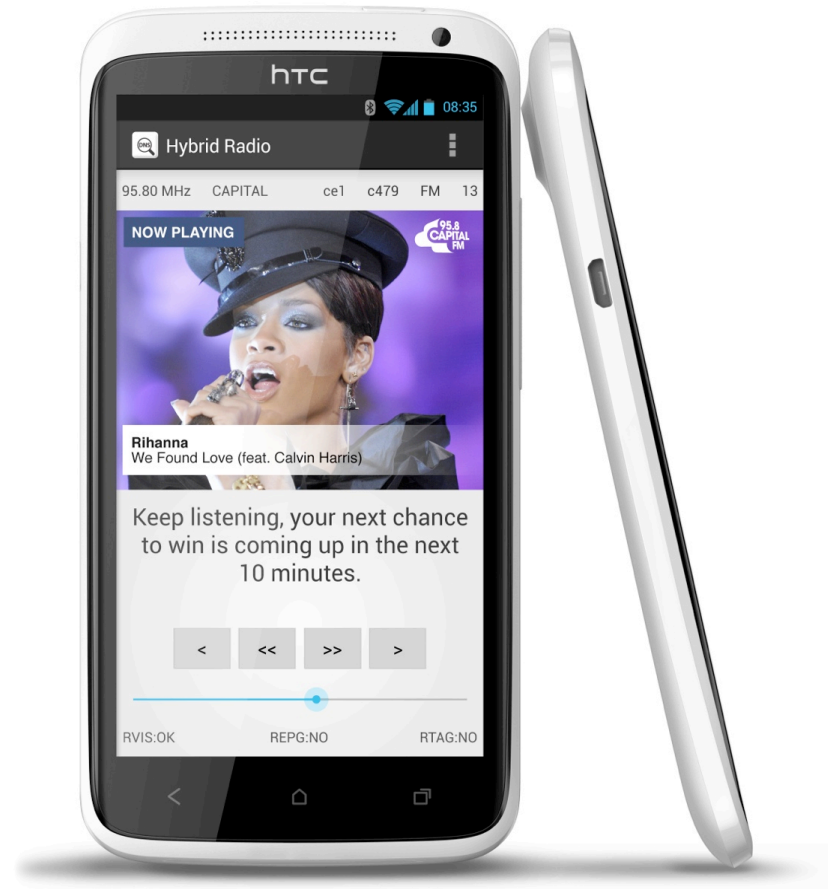
Streaming v Broadcast



Broadcast-IP Switching

Prototype App for specific
Android Phones

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How RadioDNS Works

Standards and APIs

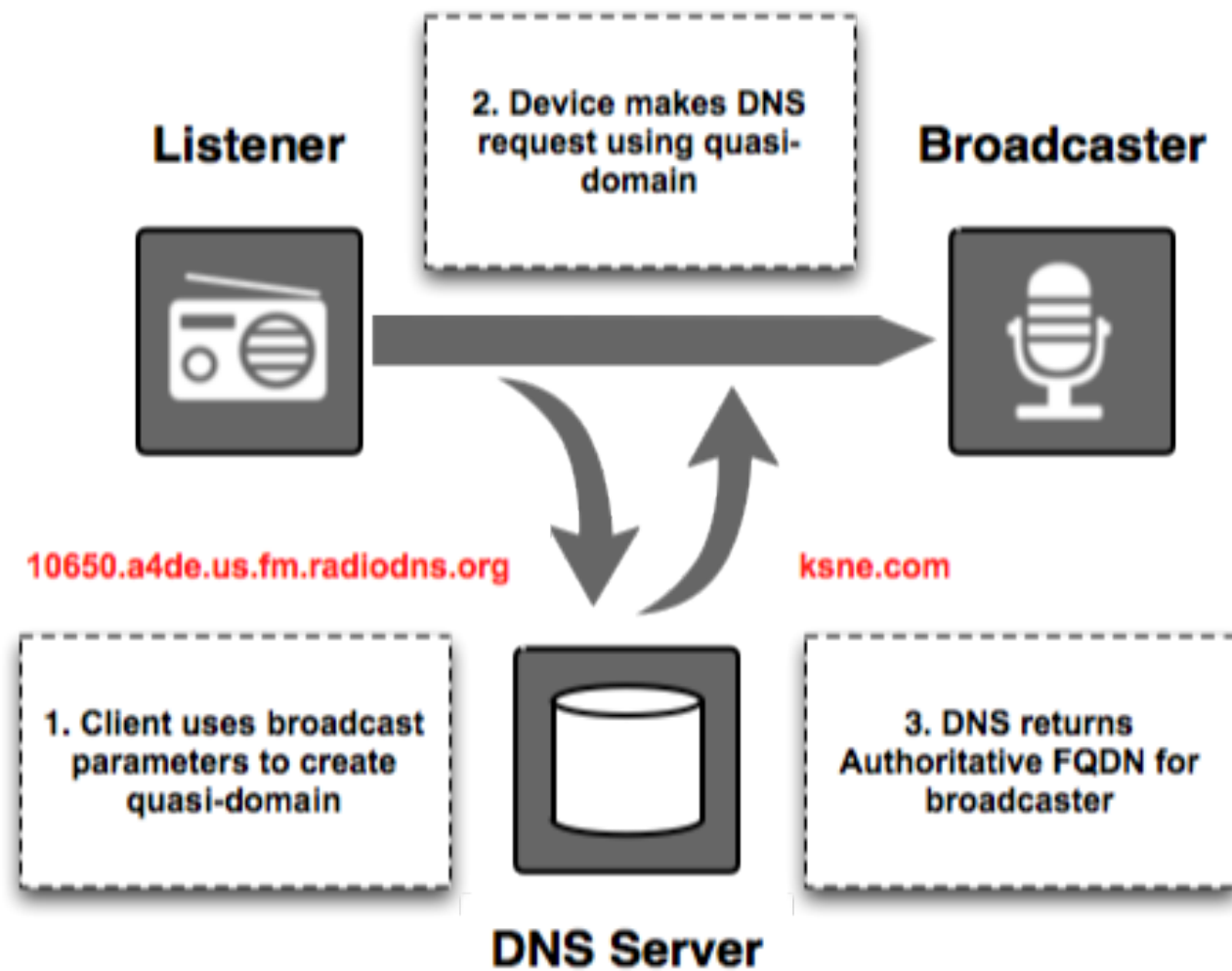
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Connected

- 106.5 MHz with PI code A4DE identified as **ksne.com**
- **ksne.com** domain is own/controlled by the broadcaster
- **ksne.com** can hold further information on services provided by that broadcaster
- All operates using **DNS** – reliable, scalable, robust

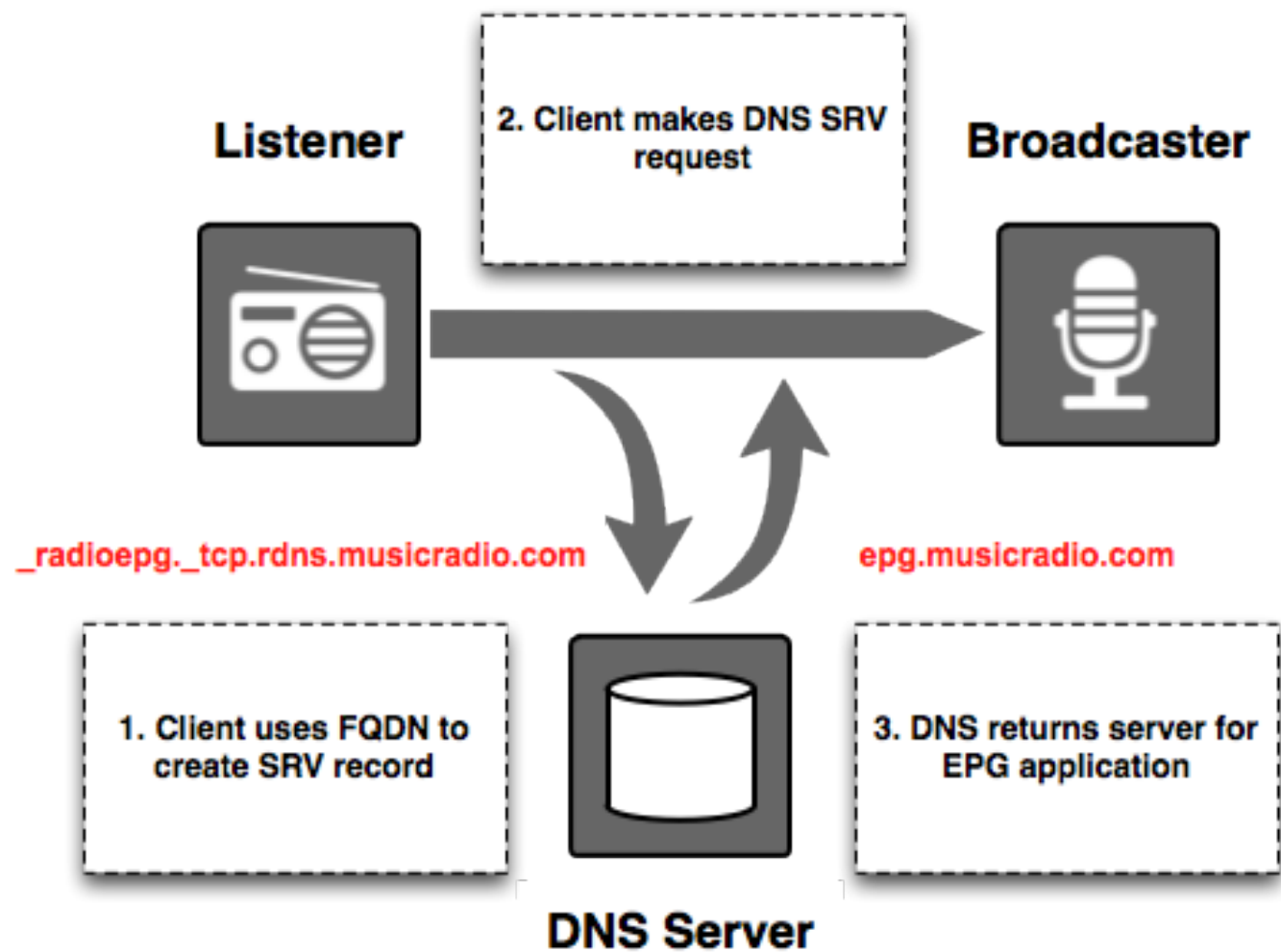
Applications



Service Information for Radio



Visuals to accompany radio



RadioEPG XSI.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<serviceInformation
  xmlns="http://schemas.radiodns.org/epg/10"
  xmlns:epg="http://www.worlddb.org/schemas/epgDataTypes/14"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://schemas.radiodns.org/epg/10 http://schemas.radiodns.org/epg/10 /radioepg_xsi_10.xsd"
  creationTime="2013-01-21T10:23:00"
  originator="Clear Channel Media and Entertainment"
  serviceProvider="Clear Channel Media and Entertainment" xml:lang="en">
```

XML Document Preamble

Includes boilerplate information about the document and the Provider of the document (in this case, Clear Channel).

```
<services>
  <service>
    <epg:shortName xml:lang="en">KSNE</epg:shortName>
    <epg:mediumName xml:lang="en">Sunny 106.5</epg:mediumName>
    <epg:longName xml:lang="en">Sunny 106.5</epg:longName>
    <mediaDescription>
      <epg:shortDescription xml:lang="en">
        Sunny 106.5 Las Vegas The Best Variety of Yesterday and Today
      </epg:shortDescription>
    </mediaDescription>
    <mediaDescription>
      <epg:multimedia url="http://www.ksne.com/template/masthead/sunny-106-51.jpg"
        type="logo_unrestricted"
        width="180" height="138" />
    </mediaDescription>
```

Descriptive Elements

Station names, descriptions (in different lengths).

Logos in different sizes and image formats.

```
<epg:genre href="urn:tva:metadata:cs:ContentCS:2004:3.6.4.5">
  <epg:name>Classic/Dance/Pop-rock</epg:name>
</epg:genre>
<epg:genre href="urn:tva:metadata:cs:ContentCS:2004:3.1.1.11">
```

Station Genre

List of genre for this station

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RadioEPG 1.1



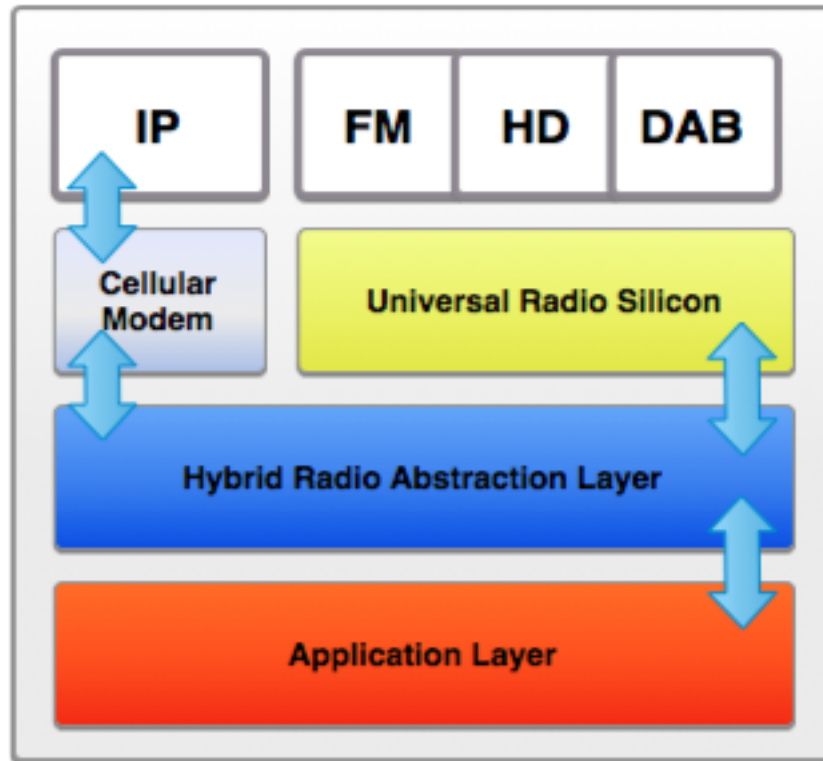
- New **Draft** RadioEPG specification
- Now aligned with IMDA SI
- Backwards compatible with DAB EPG v1.4.1 and RadioEPG v1.0
- Comprehensive meta-data resource for radio

RadioVIS Static JSON

```
{  
  "url": {  
    "RadioVIS-Destination": "/topic/fm/us/a4de/10650/image"  
    "RadioVIS-Link": "http://www.ksne.com/isplaylist/playlist.html?last10=1",  
    "RadioVIS-Trigger-Time": "NOW"  
  },  
  "body": "SHOW http://www.ksne.com/template/masthead/sunny-106-51.jpg"  
}
```

Station Logo

Architecture



- APIs abstract the variation in broadcast systems and meta-data sources
- App-friendly APIs
 - ScanList
 - Event Information

Simple APIs

- **ScanList**
 - Acquire all broadcast services and populate meta-data on them using RadioEPG / DAB EPG
- **EventRegister**
 - Register for push events from the station, received over either broadcast or IP (e.g. RadioVIS visuals)

Simple APIs

- Allow **general** developers to write Apps for radio without specialist knowledge
- Intelligently uses **efficient** broadcast automatically where available
- Minimises IP usage **seamlessly** for the user
- **Supported** by broadcasters with meta-data and content

Summary

- Hybrid Radio combines broadcast and IP **seamlessly**
- Deliver audio over **broadcast**
- Deliver **some meta-data** over broadcast
 - RDS (FM), Slideshow /EPG (DAB), Album Art (HD)
- Deliver **more meta-data** over IP



Open Standards for Hybrid Radio

Open Standards



**Aggregator /
Gatekeeper**



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The RadioDNS Approach

- **Open standards, open source** - no patents, no licences
- **Simple technology** - re-purposing what already exists
- One global standard that works with **all broadcast radio**
- **Open organisation** - trustworthy, reliable, transparent
- **We're a not-for-profit operation**

RadioDNS Resources

- **Open Source** code libraries – integrate into your code
- **Prototype** code – demonstrators to use internally
- **Testing environment** coming soon – comprehensive test patterns
- **Developer discussions** and one-to-one contact
- **New Website** coming soon – clearer resource access

gmgradio

Absolute
Radio

commercial radio
australia

FRONTIER
SILICON

NAB

Imagination
TECHNOLOGIES

BBC

EBU-UER

clearchannel
MEDIA + ENTERTAINMENT

arqiva

IRT

ABC

global
RADIO

radio
BAUER

SRG SSR

tunein
RADIO

vrt

SWR
SÜDWESTRUNDFUNK

UBC media group

vTuner

COX MEDIA
GROUP

IBIQUITY
DIGITAL

RECIVA
INTERNET RADIO

rtbf .be
Radio-Télévision belge
de la Communauté française

aim
All In Media

e m m i s
communications

NPO

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ARD

- Europe's two biggest Public Service Broadcasters
- 143m population
- 70m listeners/week

Conclusions

- **Broadcast** is still a valuable technology
- IP can be used in parallel to **enhance** radio
- Using **standard IP tools** reduces implementation costs
- **Open/interoperable system** benefits all participants
- Implementation barriers are **low**



Hybrid for Automotive

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