



North American
Broadcasters Association

NABA Radio Committee – Radio In-car User Experience (UX) Guidelines

January 2022 v.1

PRODUCED IN COOPERATION WITH THE WORLDDAB AUTOMOTIVE COMMITTEE



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Executive summary

- This is the “North American version” of the WorldDAB Radio In-car User Experience (UX) Guidelines document (January 2022)
 - Most material in this document is identical to or based upon the WorldDAB document, first developed in 2018
- Table included on next page highlights major design guideline differences between documents
 - Differences are mostly minor and due to regional preferences of listeners and radio broadcasters
 - NABA document recognizes the [HD Radio system](#) as the preferred digital radio platform for North America
 - This information is intended to compliment implementation and certification guidelines available to HD Radio licensees from Xperi
- Differences are summarized in Section 1.4 of the WorldDAB document

Executive summary

- Differences between NABA and WorldDAB documents:

Item	NABA	WorldDAB	Section(s) NABA / WorldDAB
Digital radio technology	HD Radio	DAB / DAB+	-
Discovering the radio	HD Radio on by default	Separate DAB button	5.1 / 5.1
Discovering radio stations	<ul style="list-style-type: none"> Station list organized by frequency Main and multicast channels on one station list Support combined AM and FM presets (also multicast channels) 	Organized alphabetically by station name	5.2 / 5.2
	<ul style="list-style-type: none"> Consumer can request station list update 	(not specified)	5.3 / 5.3
Service following	Optional - broadcaster should have ability to enable use of audio stream based on location	Not location specific	5.1 and 5.5 / 5.5
Voice control	<ul style="list-style-type: none"> Support for AM radio 	No AM	6 / 6
Hybrid radio	<ul style="list-style-type: none"> Station list organized by frequency Support for AM radio 	Organized alphabetically / no AM	7 / 7
AM radio	<ul style="list-style-type: none"> Include in all-electric vehicles 	(no requirement)	8 / -

1. Background – collaboration with WorldDAB

- WorldDAB first introduced an “In-car User Experience (UX) Guidelines” document in 2018 with an update in February 2019 and then again in January 2022 (most recent version [here](#))
- The WorldDAB guidelines are the result of collaboration between broadcasters and car manufacturers, and are based on seven use-cases, informed by WorldDAB driver research, to ensure the guidelines are based on the actual experience of drivers
- Given that automobiles are designed and produced for global markets, WorldDAB and NABA recognize the need for cooperation and collaboration on UX design guidelines resulting in this North American-focused version of the UX Guideline document
- To achieve this, the NABA Radio Committee (RC) has worked with WorldDAB and broadcaster organizations in Canada, Mexico and the US, including the Canadian Association of Broadcasters, Cámara Nacional de la Industria de Radio y Televisión, and the National Association of Broadcasters, respectively
- WorldDAB, through its Automotive Committee, has developed additional helpful documents which are referenced here:
 - [In-car User Experience Research](#), June 2017
 - WorldDAB Aftermarket Device [Guidelines](#)
 - Metadata [web page](#)
 - Metadata [briefing for senior broadcasters](#)
 - Metadata [information sheet](#)

1. Background – document status and future work

- This is the first North American version of the Radio In-car UX Guidelines, the NABA-RC is constantly working with NABA members, WorldDAB and automakers to make improvements and additions and will release updated versions, as necessary.

<see WorldDAB document>

2. Hybrid Radio and the Connected Car

<see WorldDAB document>

3. WorldDAB User Experience Research

4. Consumer use cases

NABA has discussed and reviewed the consumer use cases identified by WorldDAB and included in the WorldDAB version of this document and found them to be insightful and relevant to the North American market. Consequently, this North American Guideline focuses on the same set of use cases:

Consumers indicated that “I want”

1. to find radio easily in the car media system
2. to find radio stations easily
3. the list of stations to be up to date
4. to be able to easily set a station as a pre-set
5. to keep listening to my station if it's available
6. to know more about what I'm listening to
7. my radio to be set up for me

5. Design guidelines

Provided in the NABA Radio In-car UX Guidelines document are design guidelines for each use case. Readers are referred to the WorldDAB version of the document for additional background on each use case including some or all of the following items:

- The current consumer problems and research references
- What consumers want
- Consumer quotes
- Design guideline
- Hardware requirements and/or technical references
- Visual example of how the guidelines could be implemented (unless not required)

5.1 I want to find radio easily in the car media system

Design guidelines:

- Include a permanent “Radio” button on the dashboard, console or the top-level menu on the screen.
- Selecting “Radio” should default to HD Radio (when it is available) or go to a menu where radio platforms can be chosen.
- In a hybrid radio,* the best available platform signal will be automatically selected, minimizing use of a radio station’s audio stream by, for example, respecting any geographic boundaries for streaming established by the broadcaster, or analyzing the actual listenability of received broadcast signals.
- Factory default setting for HD Radio should be ON, but default behavior should also be settable by the consumer, with separate settings for AM and FM bands.
- Where there is no “Radio” button: selecting a radio station is only 2 clicks from the media system home screen.
- Provide a mechanism for no more than “2 click” switching between a projection system (e.g., Apple CarPlay, Android Auto) and car radio.

**A hybrid radio receiver is connected to both over-the-air broadcast signals and the internet.*

5.2 I want to find radio stations easily

Design guidelines:

- Present a list of all available stations, organized by frequency, for the selected band.* HD Radio multicast channels shall be incorporated into this list such that the multicast channels immediately follow a station's main channel.
- On preset (favorites) lists, allow stations from both AM and FM bands as well as HD Radio multicast channels to co-exist. It is also acceptable to have preset lists by band, again allowing for HD Radio multicast channels.

**Listeners in WorldDAB countries using DAB / DAB+ receivers prefer a station list sorted alphabetically by the service name, while in North America a numerical list by station frequency is the preference.*

5.3 I want the list of stations to be up to date

Design guidelines:

- The station list should be automatically updated when stations become available or unavailable.
- Consumers should be able to request a station list update (“band scan”), especially for receivers that have only a single tuner.
- Presets (favorites) should remain even if service is unavailable.
- For connected cars that provide a list of stations based upon vehicle location, the receiver must combine any additional stations that are currently receivable.

5.4 I want to be able to easily set a station preset (favorite)

Design guidelines:

- The action to set a preset (favorite) should always be to press and hold a button when listening to the wanted station. Recommend 5 seconds hold to set and less than 1 second response time when tapping to select.
- If the media system has physical numbered buttons, these should be used to press and hold when listening to the wanted station.
- If the media system has touch-screen soft keys, these should be numbered or clearly marked as preset buttons.
- Ensure clear instructions in the user manual for setting presets.
- Optional: If possible, on-screen prompts describing how to set a preset (until a preset has been set and therefore is understood).
- Optional: Audible feedback to confirm the preset has been saved.

5.5 I want to keep listening to my station if it's available

Design guidelines:

- For AM and FM tuners (with or without IP access), the radio should search for the best signal on AM and FM (both analog and HD Radio signals), for the station being listened to. This happens automatically.
- If there is a delay in finding a station, display a message or have an icon (for example, a rolling wheel) to say that “station tracking” is in progress.
- This function which is known technically as “Service Following/Linking” is turned ON in the car by default. The driver is notified of “best signal search is on” periodically so they understand if they don't want it. This notification should also include guidance on how to turn it OFF.
- Optional: radio stations should have the ability to enable/disable service following (*i.e.*, switching from OTA audio to internet streaming) based upon vehicle location.*

* More info available in RadioDNS technical document ETSI TS 102 818 V3.3.1 (2020-08).

5.6 I want to know more about what I'm listening to

Design guidelines:

- Single-line text display – provide a button which shows the latest text message, scrolling if necessary to fit onto the display.
- Multi-line text display – always show the latest text message without the driver having to press any buttons.
- Higher-resolution color displays – always show the latest text message. Show the station logo until the first visual is received, then show it automatically. Logos in the station list should be taken from broadcast HD Radio if available, or via IP through a service provider (examples: DTS AutoStage, Radioplayer) or RadioDNS lookup for connected vehicles.
- Connected car – request images at native screen resolution, for best quality.
- For connected cars, broadcaster-supplied metadata (broadcast/IP) should take priority over metadata (text and/or images) provided by other sources (for example, in-car databases). For broadcaster-supplied metadata, images and text provided by IP should take priority over that delivered OTA because of higher resolution images and more versatile text updates.

5.7 I want my radio to be set up automatically

Design guidelines:

- The following functions should all be on as default and form the basis of the factory reset status of the car media system:
 - Service following (in order of preference) – HD Radio / AM/FM / internet-delivered audio stream
 - By-frequency station list (default option to search)
 - Automatic station list updating
 - Default to HD Radio

6. Voice control

Voice: enabling a safer radio experience in-car

- Voice control, whether it be an OEM proprietary platform, Amazon Alexa, Google Assistant or others, lends itself perfectly to radio and significantly minimizes driver distraction.
- Voice assistants should be able to control broadcast AM and FM radio (analog and digital), as well as IP, via a hybrid radio implementation, working online and offline (perhaps to a more limited degree).
- Voice assistants must also be able to provide accurate search results for all radio stations, recognizing the phonetic detail of station names and regional dialects.
- When using voice control to access radio, the voice interface should follow the same priorities and listener preferences for signal source as the standard (non-voice) interface.
- For services with a multilingual audience, phonemes should be provided for each language.
- Car manufacturer should use these phonemes to improve recognition of spoken station names.

6. Voice control

Design guidelines:

- Manufacturers should reference <alias> and <phoneme> elements in service and program information (SPI) provided by broadcasters to determine accurate voice recognition and voice reproduction of text elements, such as station and program names.
- Broadcasters should provide <alias> elements in their SPI where there is potential for consumers to reference the station using colloquial or unofficial names.
- Broadcasters should provide <phoneme> elements for all textual elements in their SPI. Guidance on how to do this is available from WorldDAB and RadioDNS.

7. Hybrid radio

Hybrid radio: enables car manufacturers to meet the majority of the user experience guidelines

- Hybrid radio seamlessly combines broadcast radio and the internet. A broadcast signal (AM, FM, HD Radio) continues to carry audio (and some data), but a radio with an internet connection (WiFi, 3G, 4G, LTE, 5G) can seamlessly connect back to the radio station for multimedia and interactivity.
- In the car, hybrid radio offers:
 - Service following – The ability to seamlessly switch between broadcast platforms and IP, following the strongest signal.
 - Great visuals – The matching of metadata over IP with the broadcast stream to provide station logos, artist information, news, weather and commercials.
 - Interaction – Providing the listener with the ability to find out more about the content and offers the potential for greater personalization.
- Typically, an automaker will partner with a service provider for “back-end” internet-based services including delivery of broadcaster metadata and other content. Broadcasters should work directly with these broadcast metadata service providers to deliver the best hybrid radio user experience.

NABA supports open standards for hybrid radio, for more information go to <https://radiodns.org/>.

7. Hybrid radio

Design guidelines:

- Station search should be presented in a single list by station frequency where stations are listed only once and the best platform with the strongest signal is automatically selected.
- The radio should default to HD Radio, then AM/FM, then only move to IP streaming if the broadcast signals become unavailable. Once a broadcast signal becomes available again, the radio should switch back to either HD Radio or AM/FM.
- Seamless switching (seamlessly blending the broadcast and IP streams to mitigate the inherent latency and ensuring the switch of platforms incurs no time delay) is recommended. Hard switching (switching to another platform once the signal of the current platform becomes unavailable, with no attempt to mitigate the inherent latency between platforms) is possible but will provide a worse consumer experience with delays in switching between broadcast and IP.
- Broadcaster supplied metadata should take precedence over metadata from other sources. Broadcaster supplied metadata provided over IP, where available, should be used in preference to that provided over HD Radio or FM (RDS). IP provided metadata is usually more comprehensive, faster to acquire and at a high detail / resolution.

8. AM radio in all-electric vehicles

Consumer problems and research reference:

- Analog AM radio continues to be an important service in North America and is expected to remain so
- Some all-electric vehicles (EVs) being sold in North America do not have AM radio or have an AM radio capability but it is deactivated
- Testing done by Xperi and NAB PILOT (see [here](#)) has demonstrated that HD Radio all-digital AM signals in particular can be successfully received in EVs

Consumers want:

- AM radio services in EVs

9. AM radio in all-electric vehicles

Design guideline:

- Include over-the-air AM radio reception (ideally, both analog and digital) as a feature in all-electric vehicles.

Annex - Glossary of Terms

Text messages

- Defined as analog FM RDS-based RadioText, HD Radio Program Service Data (PSD) text or RadioDNS /text:
- Manufacturers:
 - Text messages must always be automatically updated on the display as they are received. Commands to “REMOVE” messages must be respected. The receiver may “throttle” message change rate to XX every YY seconds.
- Broadcasters:
 - Text messages should describe accurately what is being broadcast now, or something directly relevant to the listener.
 - Target update rate for text messages should be not more than once every 30 seconds.

Annex - Glossary of Terms

Service label

- Defined as FM PS, HD Radio SIS station slogan field or RadioDNS Name elements.
- Manufacturers:
 - There is no requirement to update a service label while receiving a service (e.g., “scrolling PS”)
 - In markets where PS is unreliable, it can be discarded in favor of HD Radio SIS station slogan field or RadioDNS Name elements, if the service is correctly identified
 - Display the longest Service Label that can fit the available display space without scrolling:
 - RadioDNS <longName> element
 - HD Radio SIS station slogan field (16 characters) or RadioDNS <mediumName> element
 - FM RDS PS (8 characters) or RadioDNS <shortName> element

Annex - Glossary of Terms

Station Logo

- HD Radio Artist Experience
- RadioDNS <mediaDescription> element
- Manufacturers:
 - The station logo must be displayed at the highest resolution for the available display space.
 - The station logo with the closest available resolution must be selected for display, and scaled to fit, but the aspect ratio must not be changed.
 - See WorldDAB / Radio DNS guidance on provision of station logos [here](#).
- Broadcasters:
 - Must provide 5 versions of your logo on IP.
 - Station Logo should be allowed to be cached for up to 30 days.
 - Station Logo must not feature any transparency layers.

Annex - Glossary of Terms

Phonemes

- Phonemes describe how words are pronounced
- Phonemes are good for voice recognition and voice control
- Phonemes help to improve voice recognition better detect spoken words and allow better voice output to the User
- Phonemes are different for different languages or dialects
- Phonemes are part of Station Corporate Identity and Corporate Design
- Station names are often pronounced differently then transmitted and shown to user
- Example:
 - NRJ pronounced as Energy as phoneme ehnərɔ̃ʒi
 - 2FM pronounced as Twofm as phoneme tu'eh'fm
 - Most systems will not understand the user if he asks for 2FM or NRJ because voice assistant would need to have different Phonemes for different pronunciation NRJ -> nrj or 'ehnərɔ̃ʒi

About NABA

The North American Broadcasters Association (NABA) mission is to identify and take action on technical, operational and regulatory issues affecting North American broadcasters.

NABA will ensure its continuing relevance to the changing digital and linear broadcast media reality of our member companies by responding to the operating and technology issues of member companies and their digital and linear broadcast media operations, providing consensus solutions, education and best practices.

NABA's strategy will focus on:

- A Relevant and Compelling Agenda

- Communications

- International Engagement

- Membership that reflects a diverse media community and encourages gender balance within member companies and the wider industry

<https://nabanet.com/>

