



VIVID NAV

# Hybrid Navigation

Cloud-first and always available



## Freshest map, search and navigation where it matters.

People drive locally most of the time. In fact, eighty percent of the driving is done within a hundred square kilometer “home area”. VIVID Nav Hybrid Navigation functionality is designed to always give users the most up-to-date maps, routing and search in their home area, and stream the latest when they venture beyond. Uninterrupted. And when there’s no connection, they can still count on on-board maps and routing to get them to their destination. Uninterrupted.

## Stream what you need, when you need it.

Venturing out of the home area, the user still has access to the latest routing and search results. VIVID Nav streams map content along the route to continually provide users with the best navigation experience. This functionality is available when the user is following a defined route or on a free drive.

## No connectivity? No problem.

VIVID Nav takes full advantage of the cloud and connectivity to provide excellent navigation. If connectivity gets spotty, it’s not a problem within the home area, since map data and content is continuously updated in a local cache. Outside the home area, if VIVID Nav determines loss of connection is more than momentary, it seamlessly switches to onboard routing using map data and content that is stored locally. All in all, the user won’t miss a beat, either on an active navigation route or in free drive.

## User convenience at low costs.

VIVID Nav hybrid functionality elegantly blends user convenience with operational costs. Defining and updating the home area periodically, while streaming map data and content only when needed, minimizes the automaker’s cost of data downloads and over-the-air operations. Add to that the seamless way VIVID Nav handles navigation when connected (or not), and you have a perfect balance of cost and ease-of-use.

## The benefits start with the driver’s home area.

Home area is a configurable geographic range where the user drives most often. Even after it is configured, VIVID Nav continually keeps track of where the user drives and intelligently recalculates the boundaries of the home area where maps, search, and points-of-interest (POI) content is refreshed. That way the user gets the most accurate routing and search results.

## Hybrid Navigation At-a-Glance .....

### PERSONALIZED HOME AREA

- › Configurable home area defines where most of the driving is done and where map data and content is always kept fresh
- › Map data includes junction views, ADAS attributes, landmarks, POIs and addresses
- › Home area is continuously and automatically updated by analyzing the user’s driving patterns along with vehicle sensor data such as ignition on/off, door open/close

### JUST-IN-TIME MAP STREAMING

- › Just-in-time downloads of map data and content when traveling outside home area lets users travel freely outside their home areas
- › Data is streamed along and ahead of the route, and includes junction view, ADAS attributes and landmarks
- › Map data downloads cover a sufficient radius around the vehicle and route for unplanned stops and deviations

### CLOUD-FIRST, EVEN WHEN UNCONNECTED

- › VIVID Nav always uses the latest data that’s been cached
- › When loss of connectivity is detected, and it needs more than what’s in the cache, it switches to data that’s permanently stored onboard
- › The switch from the cloud-first cache to onboard is automatic and seamless; the user experience is uninterrupted, consistent and seamless

## MODES OF HYBRID NAVIGATION

- Onboard Mode** › Uses only onboard map data and is used when no cloud service is available (no connectivity, server down, or other reasons).
- Streaming Mode** › Uses the data that has been separately cached when connectivity and cloud services are available (for maps, routing, traffic, search, etc.), ensuring that the latest versions of map, traffic, and search data are used.

## HYBRID NAVIGATION OPERATION

- How the system switches modes** ›
  - › By default, Hybrid Navigation will run in streaming mode as long as cloud service is available.
  - › When the system loses connectivity and at least one important core component requires data that is not in the streaming cache, the system will switch to the onboard map.
  - › When the system regains connectivity while in onboard mode, it switches to streaming mode.
- Map updates for Hybrid Nav** ›
  - › Map updates happen at varying frequencies depending on the update cycles from the content providers.
  - › Telenav updates the cloud map with the latest version of the map, with one quarter turnaround.

## HOME AREA CONSIDERATIONS

- Size of home area** › 100 x 100 km default and configurable.
- Average space required** › 100 to 250 MB per 100 square kilometers of dense urban areas.
- Updating home area** ›
  - › Home area is updated whenever newer map data is available in the cloud compared to the cached data. The cadence of map updates is based on how often cloud data is updated and can vary from daily to monthly and quarterly.
  - › Home area can be reconfigured based on driving behavior. Reconfiguration is controlled by the OEM for a specific area or decide to let the system do it automatically.
  - › Access to vehicle sensor data such as ignition on/off, door open/close, are needed to determine the home area.

## MAP STREAMING DATA CONSIDERATIONS AND OPERATIONS

- Streamed data cache size** › Configurable in terms of MB on disk. Typical streamed data for a trip of 20 kms is 750 KB to 1 MB depending on the area.
- Map streaming parameters** ›
  - › Map streaming downloads map data around the car for a radius of 2 km. When a route is available, the system downloads data for the first 10 kms of the route by default. Options to prefetch the entire route is also available.
- Storage** ›
  - › Streamed map data is stored in a specific repository, which is part of the streaming data repository (but different from the onboard data repository).
  - › Within the streaming data repository, streaming cache data is kept separate from home area data.
- When no connectivity is available for map streaming** ›
  - › If the car is in the home area or an area covered by the map streaming cache, the system remains in streaming mode.
  - › If the car is not in the Home Area or an area covered by the map streaming cache, and new map data is needed, the system will switch to onboard mode.
  - › When connectivity returns, the system switches to streaming mode.