SENNHEISER

Sennheiser MobileConnect

System Modes

Standalone Mode & Manager Mode

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System

Sennheiser MobileConnect allows streaming live audio content with low latency and in superior quality via WiFi to connected Android and iOS smart devices. To ensure low latency and superior audio quality, unicast is used for streaming.

Application Modes

To adapt to different application scenarios and network environments, MobileConnect can be operated in two Modes: *Manager Mode* and *Standalone Mode*.

Mode Differentiation

Manager Mode offers the full range of functions but requires the setup of the MobileConnect Manager Software and DNS entries. This Mode therefor requires IT support. Settings and administration for all MobileConnect Stations in the network can be done using the Manager as single point of administration from anywhere in the network. Manager Mode requires constant internet connectivity.

Standalone Mode is easier to setup. It requires less network infrastructure and IT support. All settings and administration are done via the Local Admin Interface and streams are only available after scanning a QR-Code. Standalone Mode does not require internet connectivity.

Choosing a Mode

When choosing a Mode, the most important factors are installation size and application scenario.

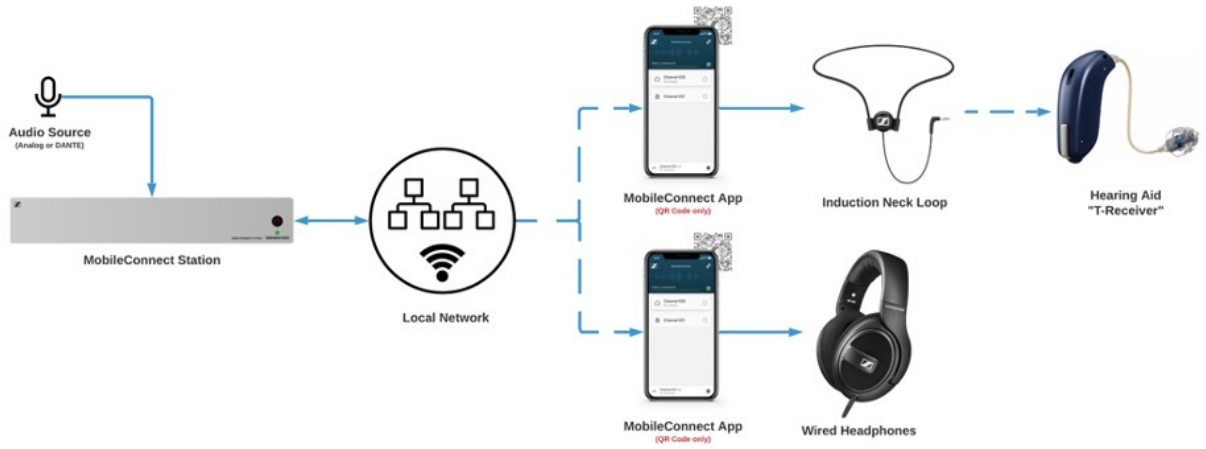
Standalone Mode

- Application with few Stations
- Priority is audio stream
- Small venue
- Limited IT support available
- No internet connectivity

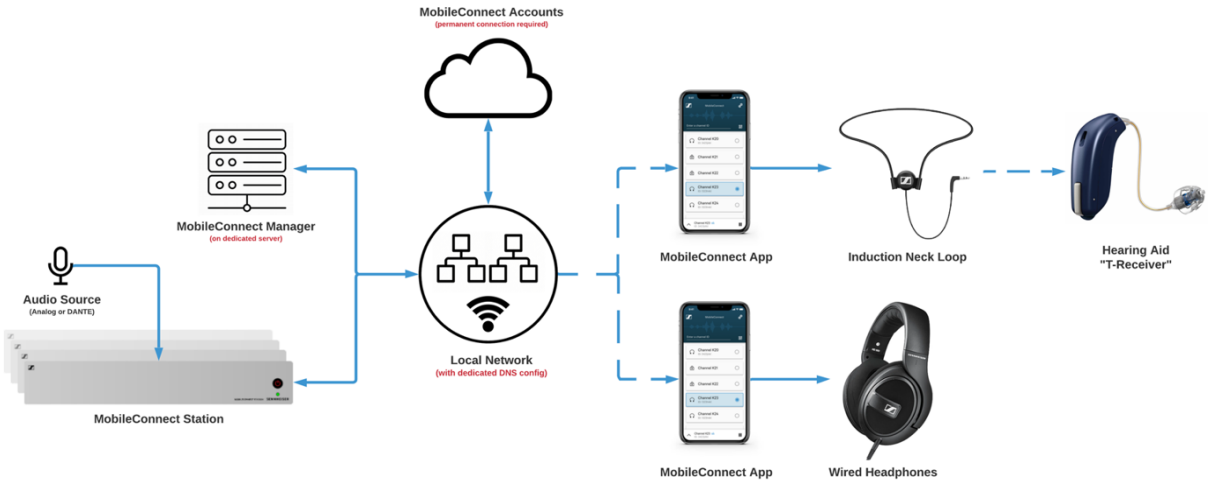
Manager Mode

- Multiple Stations
- Single point of administration and control for all Stations
- Existing IT infrastructure
- IT support available
- Internet connectivity

Standalone Mode



Manager Mode



Both modes require a local network.
The quality of the offered service depends highly on the network infrastructure.

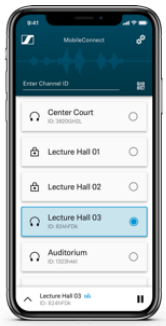
A decision for a mode is not final. A switch in any direction is possible at any time. In many cases it is advisable to use the Standalone Mode as entry mode for testing streaming functionality and switch to Manager Mode once the system is tested and its function has been approved.

Standalone Mode

Standalone Mode simplifies the setup of MobileConnect. It enables a flexible solution that is applicable for a wide range of usage scenarios.

With Standalone Mode, MobileConnect focuses on its central audio streaming function. After connecting it to a network infrastructure, it is ready to operate. Setup and installation effort are simplified in this mode, only basic IT support is required. All settings and administration are done via the Local Admin Interface. To connect to streams, users have to scan the QR-Code created in the Local Admin Interface.

In this mode, the MobileConnect Station and MobileConnect App are the system components.



Considerations

- ✓ Ease of installation
- ✓ Limited IT support required
- – Manager functionalities not available
- – Streams can only be accessed via QR-Code

The target application for Standalone Mode is the equipment of a single room (or multiple single rooms) with live audio streams.

Setup Overview

Setting up MobileConnect in Standalone Mode requires the following steps:

Hardware

Minimum hardware requirements

I **Enterprise Grade Router**

II **Enterprise Grade Access Point(s)**

Network

For Standalone Mode, a Wi-Fi network is required for transmission. Usage of an existing network infrastructure as well as the setup of a dedicated infrastructure is possible.

The data load is 165 kbps per unique client connection.

DHCP is required.

Internet connectivity

In contrast to Manager Mode, internet connectivity it is not required in Standalone Mode. However, it is recommended for all MobileConnect networks. Missing internet connectivity on the network worsens user experience significantly. Mobile devices constantly try to establish internet access. If it is not available in the connected Wi-Fi, most devices will try and switch to mobile data connection.
Additionally, connecting a device to a network without internet access limits its usability for other functions, making the system less inclusive.

The term Standalone Mode refers to the MobileConnect Station, not the network infrastructure. MobileConnect does not handle network organization.

Wi-Fi

MobileConnect relies on Wi-Fi to transmit streams to connected smartphones. The quality of the Wi-Fi is directly influencing the service's quality and performance.

Quality of Service is recommended.

Usage of 5 GHz band is recommended.

The recommended limit of number of clients per AP is 50.

The quality of the offered service depends on the network and Wi-Fi infrastructure. It has to fulfil a minimum of requirements for MobileConnect.

Configuration & Access Control

Configuration

In Standalone Mode, all setup and configuration are done using the Local Admin Interface.

With the Local Admin Interface, the following features can be configured:

MobileConnect App

- Rename channels.
- View/Change/Download QR codes and Channel IDs for your streaming channels.

MobileConnect Station

- Set Station audio configuration.
- Configure Station network interfaces.
- Update Station software.
- Reset Station.
- Reboot Station.
- Downloading Station logs.

Access Control

For advanced control and security, access to streams is by default restricted. Channels are not shown in the App but have to be unlocked via Channel ID or QR-Code. QR-Codes and Channel-IDs are downloaded and changed in the Local Admin Interface. When the Code/ID is changed, all users are disconnected from the stream.

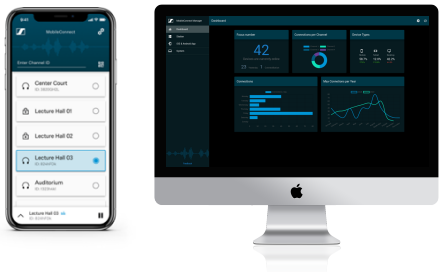
Application Flow

Manager Mode

Manager mode offers the full range of functionality of MobileConnect. The MobileConnect Manager software is added to the setup as a single point of administration for all MobileConnect Stations in the infrastructure. With the Manager, all settings and administration can be handled from anywhere in the network.

Manager Mode supports several network scenarios to adapt to existing networks and lets IT choose the most suitable integration scenario for the respective network architecture.

In this mode, the MobileConnect Station, the MobileConnect Manager and MobileConnect App are the system components.



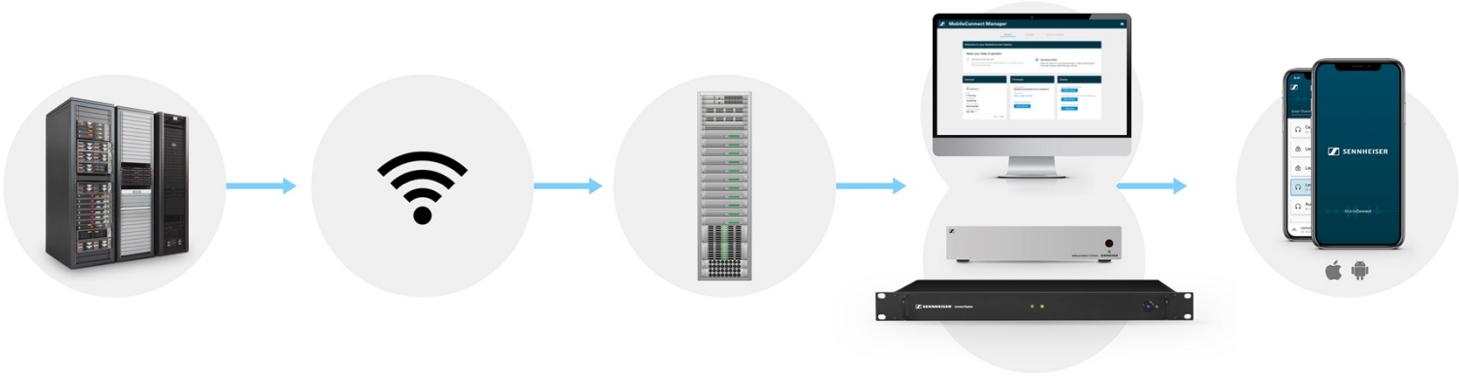
Considerations

- ✓ Manager value
- ✓ Effortless administration
- ✓ Automatic Service Discovery via DNS
- – Setup effort for Manager and DNS
- – IT support required

The target application for Manager Mode is the equipment of multiple rooms with live audio streams & the administration of all Stations in an infrastructure.

Setup Overview

Setting up MobileConnect in Manager Mode requires the following steps:



Hardware

Minimum hardware requirements

I **Enterprise Grade Router**

II **Enterprise Grade Access Point(s)**

III **Server for MobileConnect Manager installation**

IV **A device providing DNS / DHCP in the network.**

Network

For Manager Mode, a Wi-Fi network is required for transmission. Usage of an existing network infrastructure as well as the setup of a dedicated infrastructure is possible.

Data load is 165 kbps per unique client connection.

DHCP is required.

DNS in the network is required.

Internet Connectivity

The MobileConnect Manager requires internet connectivity in order to create and authenticate administration accounts and update connected MobileConnect Stations.

Internet access for the client network is highly recommended. Missing internet connectivity on the network worsens user experience significantly. Mobile devices constantly try and establish internet access. If it is not available in the connected Wi-Fi, most devices will try and switch to mobile data connection. Additionally, connecting a device to a network without internet access limits its usability for other functions, making the system less inclusive.

Integration Scenarios

There are two options for network integration scenarios from a system side:

One port solution

In this scenario, all components (MobileConnect Station, MobileConnect Manager, MobileConnect App clients) are part of the same network.
This makes for a very simple setup, light on configuration, as the only component needing active configuration is the SRV-record in the DNS-Server.

Two port solution

In this scenario there are two separate networks. One is used for the public devices, the other is used for control of the MobileConnect Station and access to the MobileConnect Manager web interface.

Using two separate networks employs a clear separation between streaming and control communication, allowing for a better confinement of the user controlled mobile devices.

Wi-Fi

MobileConnect relies on Wi-Fi to transmit streams to connected smartphones. The quality of the Wi-Fi is directly influencing the quality and performance of service.

If a Wi-Fi network is existing, it is highly recommended to use the same network for MobileConnect. Adding an additional Wi-Fi network will likely cause interference and lower the quality of service. Additionally, usage of a separate network worsens user experiences because it forces users to decide between MobileConnect and the other network's functionality.

Quality of Service is recommended.

Usage of 5 GHz band is recommended.

It is recommended to make 12 Mbps the lowest mandatory data rate.

The recommended limit of number of clients per AP is 50.

The quality of the offered service depends on the network and Wi-Fi infrastructure. It has to fulfil a minimum of requirements for MobileConnect. It is important to check network suitability prior to the integration.

Administration and Security

Configuration and Administration

In Manager Mode, all setup, configuration and administration are done using the MobileConnect Manager.
With the MobileConnect Manager, the following features can be configured:

MobileConnect App

- Renaming channel names.
- Hiding or unhiding channels.
- Creating/ Downloading QR codes and Channel IDs.

MobileConnect Stations

- Renaming a MobileConnect Station.
- Setting Station audio configuration.
- Configuring Station network interfaces.
- Updating software of MobileConnect Stations.
- Resetting of MobileConnect Stations.
- Removing a Station from the Manager.

Additionally, the *Local Admin interface* is available.

Device Security

Security is becoming an increasing need for all digital solutions. MobileConnect features advanced security. The solution makes use of industry standard IoT security practices to ensure the security of the MobileConnect system. The solution intends to provide the best security practices combined with most ease-of-use.
MobileConnect provides the following security features:

- Identification and authentication of MobileConnect Station devices connecting to MobileConnect software.
- Encrypted data flow between MobileConnect Manager and MobileConnect Stations.

Access Control

In Manager Mode, access control can be set for each channel individually. Channels are either publicly available in the network or hidden. All public channels are available in the MobileConnect App on all smartphones connected to the network.

For advanced control and security, access can be restricted by hiding channels. Hidden channels are not shown in the App but have to be unlocked via Channel ID or QR-Code. In the MobileConnect Manager, QR-Codes and Channel-IDs can be downloaded and changed. When the Code/ID is changed, all users are disconnected from the stream.

A mixture of public and hidden channels in a network is possible. For convenience, public channels can also be accessed via a QR-Code or Channel-ID created in the MobileConnect Manager.

Application Flow

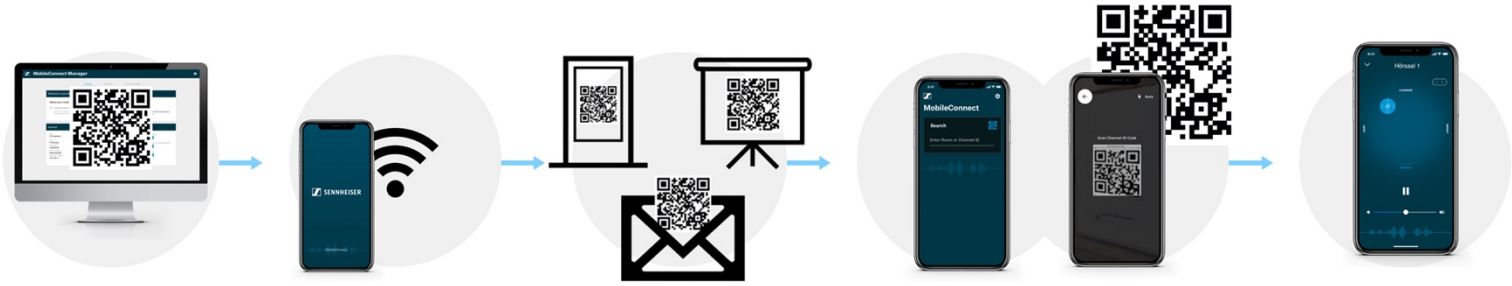
Public channels

Qr-Codes and Channel-IDs can be created in the MobileConnect Manager.

User's smartphone with MobileConnect App is connected to Wi-Fi.

MobileConnect App shows all publicly available channels in the network.
Hidden channels are not shown and only accessible via QR-Code or Channel-ID.

Hidden channels



QR-Code or Channel-ID is created in the MobileConnect Manager.

User's smartphone with MobileConnect App is connected to Wi-Fi.

QR-Code or Channel-ID is distributed to user.
E.g. via digital signage display, presentation or mail.

User enters Channel-ID or scans QR-Code.

User accesses stream directly.