Sennheiser MobileConnect

User Guide for the

IT Administrator

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About the product

Sennheiser MobileConnect is an Assistive Listening solution. The system streams audio content via WiFi live and in superior quality to any mobile device. Following the Bring-Your-Own-Device concept, it is an easy-to-use and intuitive Assistive Listening system. Costs and maintenance effort for operators are kept at a minimum. MobileConnect is optimized for use in higher education institutions.

The MobileConnect system consists of three components: the MobileConnect Station, the MobileConnect Manager and the MobileConnect App. The MobileConnect Station is integrated into the existing campus network and distributes the audio content via WiFi to the MobileConnect App on the user's personal smartphone. With the MobileConnect Manager, all MobileConnect Stations in the network can be conveniently administered and remotely managed from anywhere on the campus.

You have access to the following documents:

MobileConnect User Guide for the IT Administrator

MobileConnect Network Whitepaper

MobileConnect WiFi Whitepaper

MobileConnect Station Quick Guide (also provided with the hardware)

Quick Setup

You can configure the MobileConnect system in 5 steps:

Step 1
Configure network

Step 2
Configure WiFi

Step 3
Install MobileConnect
Manager

Step 4
Configure MobileConnect Station

Step 5
Test with
MobileConnect App

Step 1. Configure your network

You can use one single network or two separate networks for streaming and control (for more see section Network Setup). In both cases, you need to configure the following in **each network**:

DNS

The system needs a single SRV record of _mcal._tcp per network, which points to the MobileConnect Manager. You need to provide your own DNS server. The following example is for the Linux bind DNS server, adapt it to your DNS server in use.

Service Name	TTL	Class	Type	Priority	Weight	Port	Target
_mcal._tcp.yourdomain.com	3600	IN	SRV	0	0	8000	*mc-manager .yourdomain.com.*
mc-manager.yourdomain.com	3600	IN	A				*IP address of mc-manager*

- Replace "*yourdomain.com*" with your own domain
- Use FQDN and not a direct IP address for the SRV "Target"
- The target hostname "mc-manager" can be replaced with any hostname you want to give to the MobileConnect Manager. Above you can see an example of the A record.

DHCP

The following DHCP settings are required so that the MobileConnect Apps can discover the MobileConnect Manager:

- For Android → configure the "domain part" of the DHCP protocol, as Android ignores search domains
- For iOS → the "domain part" must be used or if you have multiple search domains, it must be also set in the search domains
- The MobileConnect Station respects the domain part and the search domains

Step 2. Configure your WiFi

Configure traffic prioritization on your Access Points:

- streaming uses **DSCP EF** value
- control uses **DSCP CS3** value

> **Without prioritization you cannot achieve good audio quality and low latency. We strongly advise not to use MobileConnect without it.**

Step 3. Install the MobileConnect Manager

The MobileConnect Manager is a dockerized application which runs on **Linux x86-64 (amd64), Ubuntu 18.04**. The steps provided below are for this Ubuntu version, please do not try them on Ubuntu 20.04 or any other Linux.

A. First, select your **hardware**:

Minimum hardware requirements

- CPU with 4 cores
- Regular (not boost) clock speed on all cores at least 2.4 GHz
- 8 GB of RAM
- 200 GB of hard drive space

Recommended hardware requirements

- CPU with 8 cores
- Regular (not boost) clock speed on all cores at least 3.0 GHz
- 16 GB of RAM (or more)
- 500 GB of hard drive space

B. Install **Ubuntu server 18.04** in 64-bit architecture

> You can find it here: https://releases.ubuntu.com/18.04.4

- Ubuntu Desktop works as well.

- Currently only Ubuntu 18.04 is supported, **do not install or upgrade to Ubuntu 20.04**. It is not advisable due to interoperability/stability issues between docker and Ubuntu.

C. Configure the **hostname** → you can use "mc-manager" or any of your choice.
   - Make sure it matches your DNS configuration (see Step 1. Configure your network).

D. Install **docker** and **docker-compose**
   - The Manager supports docker version 19 or higher and docker-compose version 1.22 or higher.
   - First uninstall old versions with:

```
sudo apt-get remove docker docker-engine docker.io containerd runc
```

   - o This command will remove existing packages or throw a warning if such packages cannot be located. You can ignore the warning.

   - Install the desired docker and docker-compose versions with:

```
sudo apt update
sudo apt install docker.io=19.03.6-0ubuntu1~18.04.1 docker-
compose=1.17.1-2
```

   - o You might be asked to restart services during the installation, select "Yes".

   - Add your user to the docker group and reboot

```
sudo groupadd docker
sudo usermod –aG docker $USER
sudo reboot
```

> For more information on managing docker as a non-root user, see here:
> https://docs.docker.com/engine/install/linux-postinstall/

   - Enable the docker service to start at boot

```
sudo systemctl enable docker
```

> For more information about installing docker and docker-compose, see here:
> https://docs.docker.com/install/linux/docker-ce/ubuntu
> https://docs.docker.com/compose/install

E. Obtain the MobileConnect **Manager** installation package

- Register your organization at https://accounts.sennheiser-connect.com/.
    - o You need to provide an email address, which you must later use to log in to your MobileConnect Manager.

> Register only one admin user per MobileConnect system. In the future it will be possible to have multiple users per system.

- Configure your "Organization Name", e.g. "Sennheiser Streaming Technologies"
- Add a redirect URL which should match the URL / domain name used to access your MobileConnect Manager in your network. Once you configure it, you will be automatically redirected to your Manager application after login (e.g. https://mc-manager.yourdomain.com or https://mc-manager).

> To access your MobileConnect Manager after installation, open a browser and open the redirect URL. It can be a private domain or URL, but not an IP address or "localhost".

- Click "Save" and wait for your account to be created.
- Select "Download Manager" to obtain installation and configuration files for the MobileConnect Manager.

> If you modify your organization data (name or URL) you need to download a new installation package and install it for the changes to be applied. Detailed description on how to do that can be found here: MobileConnect Manager upgrade

F. **Install** the MobileConnect Manager
- Create an installation directory with a name/path of your choice. We recommend installing as a normal user in your home directory.

```
mkdir /home/$USER/mcmanager
```

- Copy the MobileConnect Manager installation packageto the installation directory.

```
cp MobileConnectManager.zip /home/$USER/mcmanager
```

- Enter the directory.

```
cd /home/$USER/mcmanager
```

- Extract the archive.

```
sudo apt install unzip
unzip MobileConnectManager.zip
```

- Set your database password as local environment variable

```
export SA_PASSWORD='MyPass123'
```

- o An environment variable is set, run all docker-compose commands in the same terminal.
- o **Make sure you keep the password. You will need it when upgrading the MobileConnect Manager in the future.**

> The password must be at least 8 characters long and contain characters from three of the following four sets: Uppercase letters, Lowercase letters, Base 10 Digits and Symbols.

- Install and run with:

```
docker-compose pull
docker-compose up -d
```

- Wait for 3 to 5 minutes until the initialization of the MobileConnect Manager is completed.
- Open a browser and navigate to the URL you configured for your MobileConnect Manager, e.g. *https://mcmanager.yourdomain.com*.
  - o The MobileConnect Manager web interface is using a self-signed certificate, you need to accept it to access.
  - o Currently the Manager supports the Chrome and Firefox browsers

- Login with the credentials you used for registration at https://accounts.sennheiser-connect.com.

> Always login with the email you used for the MobileConnect Manager you downloaded.

- The MobileConnect Manager is now ready to use.

Step 4. Install the MobileConnect Station

There are two versions of MobileConnect Station (MCS) hardware:

MCS v1

MCS v2

> In order to use a MCS v1, you need to upgrade its firmware. For details, see section Upgrading a legacy MobileConnect Station.

- Connect your MCS to the network
  - o Use **LAN2** (MCS v1) or **PoE/Stream** (MCS v2) port to connect your streaming network.
  - o Use **LAN3** (MCS v1) or **Ctrl** (MCS v2) port optionally to connect a second network for configuration. If you do not wish to use a separate network, and the port is not connected, the system will use the streaming network for control as well.
  - o **Note:** The network ports use DHCP by default. To configure a static IP:
    - ▪ Configure your PC with the static IP address 192.168.0.2, netmask: 255.255.255.0.
    - ▪ Connect the **LAN1** or **Ctrl** port directly to your PC.
    - ▪ Open your browser and navigate to http://192.168.0.10 to open the local admin interface.
    - ▪ You can configure the network and a static IP address using the local admin interface.
- Connect your audio inputs
  - o For MCS v1 you can connect any of the four analog inputs.
  - o For MCS v2 you can use the analog or Dante inputs.

- Power on
- Verify the MobileConnect Station is up and running
  - Open the MobileConnect Manager interface (e.g. at https://mc-manager.yourdomain.com or https://your-manager-hostname).
  - Select "Stations". Your station should be shown as "running" in the MobileConnect Manager interface.

> For more advanced features see section Manager and Station configuration.

- In case of problems, see section Troubleshooting.

Step 5. Test with the MobileConnect App

- Install the **Sennheiser MobileConnect** App from the Apple AppStore or Google PlayStore.


- Connect to the user WiFi network.
- Start the app.
- You should see a channel list and be able to select a channel and stream audio.
- In case of problems, see section Troubleshooting.

Network setup

The MobileConnect system supports several network scenarios, described in detail in the MobileConnect Network Whitepaper. You can choose the most suitable one for your network architecture. Below you can find the simplest setup using a single network for streaming and control.

- Streaming network - used for the public devices
- Control network - used for control of the MobileConnect Station and access to the MobileConnect Manager web interface
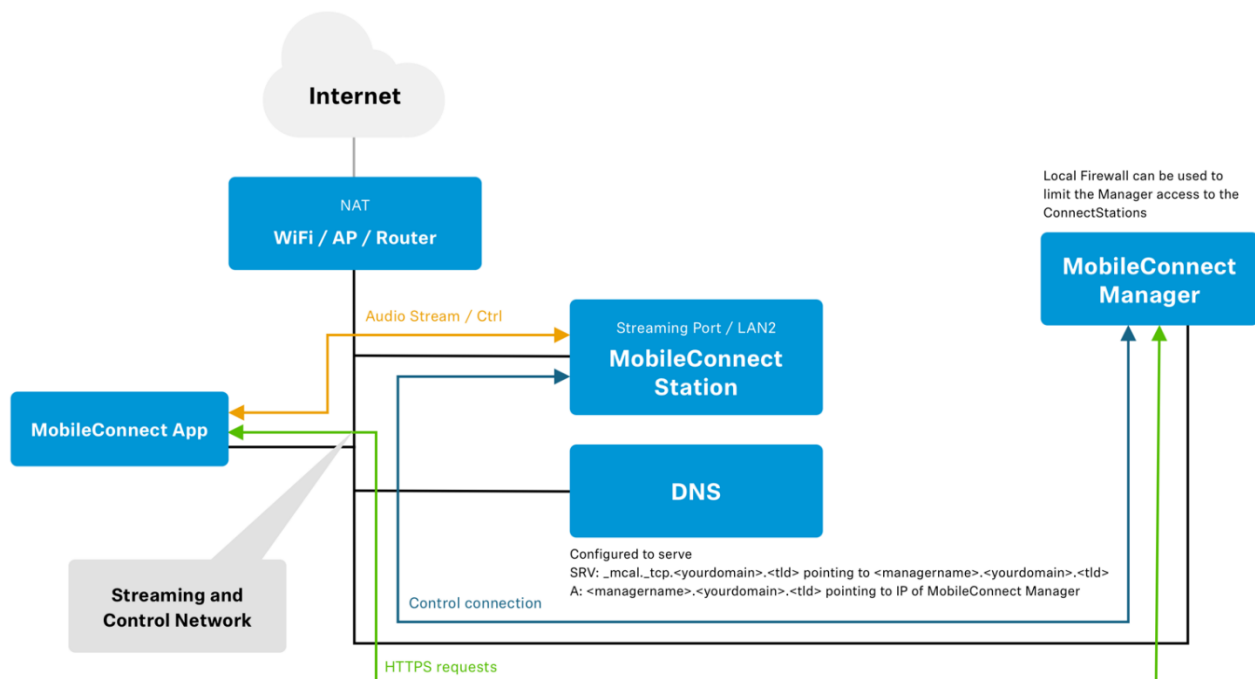
The MobileConnect system also supports **NAT** and **Eduroam**.

More advanced scenarios and recommendations are covered in detail in the Network Whitepaper, such as:

- Using two separate networks for streaming and control, for better network separation and improved security
- Add a proxy to limit access to the MobileConnect Manager
- Firewall recommendations

> The MobileConnect Manager requires the following ports to be open:
>
> - Port 8000 needs to be accessible from the mobile clients
> - Port 80/443 needs to be accessible from the MobileConnect Station and the systems used to access the Manager interface

Manager and Station configuration

Simply open the MobileConnect Manager interface in a browser at the URL you configured (e.g. at https://mc-manager.yourdomain.com or https://your-manager-hostname).

- The MobileConnect Manager currently supports the **Chrome** and **Firefox** browsers.

With the MobileConnect Manager, you can configure the following features:

- MobileConnect App

  - o Channel names
  - o Audio configuration
  - o Hidden channels and QR Codes

- MobileConnect Stations

  - o Network configuration
  - o Software updates for MobileConnect Stations
  - o Reset for MobileConnect Stations
  - o Since MobileConnect Station firmware version 6.0.0, it is possible to reboot a Station using the Manager

> The MobileConnect Station network can also be configured in the following way:
>
> - Configure your PC with the static IP address 192.168.0.2, netmask: 255.255.255.0.
> - Connect the LAN1 or Ctrl port directly to your PC.
> - Open a browser and navigate to http://192.168.0.10 to open the local admin interface.
> - You can configure the network and a static IP address using the local admin interface.

Software upgrade/downgrade, System reset

MobileConnect Manager upgrade and redeploy

You can perform an update or redeploy of the Manager the same way the initial installation is done. Always download the latest Manager configuration files to make sure you have the latest version, redirect URL and other configuration.

First, we recommend that you perform a backup of the Manager database before updating your Manager. See section [MobileConnect Manager database](#).

- Enter your installation directory and stop the Manager.

```
cd /home/$USER/mcmanager
docker-compose down
```

- Set your previously configured database password as local environment variable.

```
export SA_PASSWORD='MyPass123'
```

- Open a browser and go to https://accounts.sennheiser-connect.com. Login with your credentials and download the latest installation package.
- Copy the installation package to the installation directory and extract the archive.
- Install and run with.

```
docker-compose pull
docker-compose up -d
```

For more details, see section [Step 3. Install the MobileConnect Manager](#).

MobileConnect Manager database

The MobileConnect system uses a SQL Server 2019 database running in a Docker container. We recommend that you do a backup of your MobileConnect database regularly. Here is an example of how to do that.

1. Backup

```
# Example PATH_FOR_BACKUP=~/backup

export PATH_FOR_BACKUP=~/backup
docker stop mcm_database

mkdir -p $PATH_FOR_BACKUP

docker run --rm --volumes-from mcm_database -v
$PATH_FOR_BACKUP:/backup --name mcm_database_backup ubuntu bash -c
"cd /var/opt/mssql && tar cf /backup/mcm_database.tar ."

docker rm -f mcm_database_backup

docker start mcm_database

# Check the database volume name (needed for restoring), with

docker volume ls | grep sqldata
```

2. Restore

```
# Example PATH_FOR_BACKUP=~/backup
export PATH_FOR_BACKUP=~/backup

# Example DATABASE_VOLUME=mcmanager_sqldata
export DATABASE_VOLUME=mcmanager_sqldata

docker stop mcm_database

docker volume create $DATABASE_VOLUME

docker run --rm -v $DATABASE_VOLUME:/recover -v
$PATH_FOR_BACKUP:/backup ubuntu bash -c "cd /recover && tar xvf
/backup/mcm_database.tar"

docker start mcm_database
```

MobileConnect Manager stop and remove containers

You can stop your MobileConnect Manager and remove the created docker containers in the following way:

```
cd YOUR_MANAGER_INSTALLATION_DIR
docker-compose down
```

MobileConnect Station update

The software upgrade and downgrade of a MobileConnect Station can be performed using the MobileConnect Manager.

- Connect your MobileConnect Station to your MobileConnect network.
- Open the MobileConnect Manager and go to Stations.
- Select your device.
- Click "recheck firmware versions" to check for the latest firmware version.
- Click "Start update".
- Select a version and click "Update now".
  - In case of errors shown on the Manager during the firmware update which are not resolved over time, reboot the MobileConnect Station.
  - Since Station version 6.0.6, the reboot can be performed via the Manager.

> For upgrading a MCS v1 from software version 5.1.0 to higher, see section Upgrading a legacy ConnectStation.

MobileConnect Station reset

A software reset of the MobileConnect Station can be performed using the MobileConnect Manager.

- Connect your MobileConnect Station.
- Open the MobileConnect Manager and go to Stations.
- Select your station.
- Select "Reset device".

Upgrading a legacy MobileConnect Station

There are two versions of the MobileConnect Station (MCS) hardware:

MCS v1
2015-2020

MCS v2
Current version

MCS v1

Previously, the MobileConnect system supported two network modes: integrated mode and standalone mode. It operated in a self-forming cluster. After MobileConnect Station release 6.0.0 the system has been completely redesigned. The existing modes of operation are no longer supported.

All previously bought MobileConnect Stations can be upgraded to run the new firmware version 6.0.0 and above. Before making the decision to upgrade, please consider the following:

Why you should upgrade:

- MobileConnect Station versions 6.0.0 and above are more stable, easier to integrate into existing network infrastructure and deliver a superior audio experience with the new MobileConnect App.

> ▪ Customers, who want to continue using the legacy system (firmware 5.1.0 and below), can do so and are advised to update their firmware to the latest version 5.1.0.
> ▪ However, this is the last release for the legacy system. There will be no future updates.

Use cases when to update

- You are using the MobileConnect Station in integrated mode using DNS → you can easily upgrade to the latest version.
- You are using the MobileConnect Station in integrated mode using Multicast → you can easily upgrade to the latest version, but you have to configure DNS service discovery.

> ▪ Multicast service discovery is not supported anymore, due to lack of support in some network and mobile devices.

Use cases when <u>not</u> to upgrade

- You are using the MobileConnect Station in standalone mode → in order to upgrade standalone mode, you need to integrate it into an existing network with Internet access, DNS service discovery, DHCP server and WiFi infrastructure.

> - Standalone mode is not supported anymore.

- You are using CinemaConnect and subtitles → the latest firmware does not support subtitles.

- You cannot provide internet access in your network → the latest firmware will not work in a network without internet access.

How to upgrade

Follow the instructions in the Quick Setup Guide to setup your network and the MobileConnect Manager. Before completing *Step 4. Install the MobileConnect Station,* upgrade your MobileConnect Station v1 in the following way:

- To get the latest firmware image, please send an email to **mc-support@sennheiser.com**

- Create a bootable USB flash drive (FAT 32 compatible, 16GB or more, USB 2.0 or higher)

  Example command Linux:

```
dd if=ConnectStation-6.0.5-release-21-installer.wic of=/dev/sdb
bs=4MB && sync
```

- Power off the MobileConnect Station, plug the USB flash drive into it and attach a USB keyboard, boot it, and then press enter to start the installation.

- After a few minutes, the MobileConnect Station will power off when finished. Unplug the USB flash drive.

- Continue with Step 4. Install the MobileConnect Station

Troubleshooting

MobileConnect Manager and Stations

General recommendations

- Do not upgrade your Manager server to **Ubuntu 20.04**.
- The MobileConnect Manager must always be connected to the **Internet**.
    - During all installation steps.
    - Before you can log in.
- The MobileConnect **redirect URL** is stored in the MobileConnect Manager zip file you have downloaded, that means:
    - If you change your DNS entries, you need to redeploy your MobileConnect Manager (see MobileConnect Manager upgrade and redeploy).
    - If you change your redirect URL using https://accounts.sennheiser-connect.com/, you need to redeploy your MobileConnect Manager.
    - You can only access the Manager using the redirect URL. Using the Manager server IP address will not work.

MobileConnect Manager restart

> The MobileConnect Manager is not starting after server reboot.

- After a restart of the MobileConnect Manager server or power outage, the docker containers are not always restarted properly.
- Make sure that automatic restart of docker is enabled as shown in Step 3. Install the MobileConnect Manager.
- Run the following commands to fix the issue:

```
cd /home/$USER/your_mcmanager_installation_dir
export SA_PASSWORD=YourPass
docker-compose restart
```

Connectivity

> The MobileConnect Station is not shown in the MobileConnect Manager list of stations.

- Make sure the MobileConnect Manager is running before the MobileConnect Stations or reboot the MobileConnect Stations, after the MobileConnect Manager is started.
- Make sure the DNS configuration is correct, see Step 1. Configure your network.

MobileConnect Station update

> The MobileConnect Station update was interrupted before it was completed.

- If the MobileConnect Station is not updated and there are no errors on the Manager interface after the interruption → retry updating.
- The MobileConnect Manager is showing an error after the interruption → restart the MobileConnect Station and try again.
- The error message is still shown after restarting the MobileConnect Station → restart the MobileConnect Manager.

```
docker restart $(docker ps -a -q)
```

> The MobileConnect Station update is not started after clicking "Start update" button.

- Restart the MobileConnect Manager Docker containers and try again.

```
docker restart $(docker ps -a -q)
```

Note: this may interrupt streaming.

MobileConnect Station network configuration

> You configured the IP address 192.168.0.10 on the LAN2/PoE/Streaming port or LAN3/Ctrl port.

- This port is used for the local administration interface and using it on the network ports may cause the local interface to become inaccessible.
- To fix → unplug the LAN2/PoE/Stream port and perform a reset followed by a reboot.
- Alternatively change the IP address via the MobileConnect Manager.

> You configured an IP address in the subnet 192.168.0.0 on the MCSv1 LAN2 or LAN3.

- The local administration interface may become inaccessible.
- To access it again via LAN1 → unplug the LAN2 and LAN3 cables.

MobileConnect Manager web interface

> The MobileConnect Manager interface is showing the error message "Live updates are temporarily interrupted" often.

- This indicates there are interruptions in network connectivity.

> The MobileConnect Manager interface is showing a blank (black) page.

- Make sure that your Manager PC has Internet connection.
- You have to accept cookies from the Managers hostname.
- You also have to accept a third party cookie from sennheisersst.b2clogin.com.
- List all dockers with the command below and check if any have status "Restarting".

```
docker ps
```

- If some dockers are restarting, please make sure you set your database password as local environment variable during the Manager installation – see Step 3. Install the MobileConnect Manager.

```
cd YOUR_MANAGER_INSTALLATION_DIR
docker-compose down
export SA_PASSWORD=Mypass123
docker-compose up -d
```

- If you are still experiencing the same problem -> restart all dockers.

```
docker restart mcm_configuration_api mcm_manager_web mcm_updater_api
mcm_database mcm_lister_api mcm_gateway mcm_messagebroker
mcm_registry
```

- If you still have issues, contact us at **mc-support@sennheiser.com**.

MobileConnect Manager is not loading – request time out shown in the browser console

- You might have a DNS rebinding issue, which happens, if your router has an active DNS rebinding protection. In this case, the router will not resolve any hostnames, which are part of your local network. This is common for many small business routers, where you use private IP addresses locally. Please refer to your routers manual to resolve this. In some cases, you can add your MobileConnect Manager's hostname to a white list or disable DNS rebinding protection.

MobileConnect Manager page is doing endless reloads (in Firefox)

- Go to "Privacy" settings in your browser. Either use the default privacy settings ("strict") or in "custom privacy settings", you have to allow third party from visited websites only. After changing the settings, you have to restart Firefox.

MobileConnect Apps

iOS devices can connect, Android cannot.

- configure DHCP properly (see Step 1. Configure your network, DHCP)

MobileConnect App shows no channels to select.

- Make sure that the mobile device is still connected to the MobileConnect WiFi
- Make sure that the channels are configured in the MobileConnect Manager admin interface/Mobile App Configuration
- Make sure that the DNS configuration is correct, see Step 1. Configure your network