Mobilaris Companion WiFi User Guide

⚠ WARNING: Battery safety

Your device uses rechargeable battery (non-user-replaceable battery). Improper use of your device's battery may result in fire or explosion. Do not heat, open, puncture, mutilate, or dispose of your device or its battery in fire or a hot oven. Do not leave or charge your device in direct sunlight for an extended period of time. Doing so may cause damage or melt the battery.

Leaving a battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.

A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.

Epiroc recommends that you seek professional assistance for all other device repairs, and that you use caution if undertaking do-it-yourself repairs. Opening and/or repairing your device can present electric shock, device damage, fire, and personal injury risks, and other hazards.

This marking on the product indicates that the product, battery and it's electronic accessories (e.g charger, USB cable) should not be disposed of with other household waste.

FCC statements and RF exposure warning

§ 15.19 Labeling requirements. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. § 15.21 Information to user. Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. § 15.105 Information to the user. Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The SAR limit for FCC is 1.6 W / kg averaged over one gram of tissue. The Mobilaris Companion WiFi model device types (FCC: 2A93V-466F) were also tested against these values. The highest SAR values reported for the accessory worn on the body is 0.73 W/kg. This device has been tested for typical operations using the accessory worn on the body with the rear part of the product kept at 5 mm from the body. To maintain compliance with FCC requirements, use accessories that maintain a separation distance of 5 mm between the user's body and the back of the product. The use of belt clips, cases and similar accessories shall not contain any metal components as a whole. The use of accessories that do not meet these requirements cannot meet the requirements of FCC, and should be avoided.

IC (Industry Canada) Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:
- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

The SAR limit for Industry Canada is 1.6 W / kg averaged over one gram of tissue. The Mobilaris Companion WiFi model device types (IC: 29959-466F) were also tested against these values. The highest SAR values reported for the accessory worn on the body is 0.73 W/kg. This device has been tested for typical operations using the accessory worn on the body with the rear part of the product kept at 5 mm from the body. To maintain compliance with RSS-102 requirements, use accessories that maintain a separation distance of 5 mm between the user's body and the back of the product. The use of belt clips, cases and similar accessories shall not contain any metal components as a whole. The use of accessories that do not meet these requirements cannot meet the requirements of RSS-102, and should be avoided.

Le présent appareil est conforme aux CNR d'Industrie Canada applicable aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

La limite SAR pour Industrie Canada est de 1,6 W/kg en moyenne sur un gramme de tissu. Les modèles de

dispositifs Mobilaris Companion WiFi (IC : 29959-466F) ont également été testés par rapport à ces valeurs. Les valeurs SAR les plus élevées rapportées pour l'accessoire porté sur le corps sont de 0,73 W/kg. Ce dispositif a été testé pour des opérations typiques en utilisant l'accessoire porté sur le corps, avec la partie arrière du produit maintenue à 5 mm du corps. Pour rester conforme aux exigences de la norme RSS-102, utilisez des accessoires maintenant une distance de séparation de 5 mm entre le corps de l'utilisateur et l'arrière du produit. L'utilisation de pinces de ceinture, de boîtiers et d'accessoires similaires ne doit contenir aucun composant métallique dans son ensemble. L'utilisation d'accessoires qui ne répondent pas à ces exigences ne peut pas satisfaire aux exigences de la norme RSS-102 et doit être évitée.

ICASA (Independent Communications Authority of South Africa)

TA 2023-0522

APPROVED

1. Mobilaris Companion WiFi

The Mobilaris Companion WiFi, PN 3049900039, is a rechargeable Wifi personal and vehicle tracking tag developed for mining and tunneling applications.

The tag can provide positioning using both WiFi Access Points (AP) and Bluetooth Low Energy (BLE) beacons. The battery is rechargeable, either via standard USB-C charger or a separately sold charging rack. It has an accelerometer for battery saving features and movement detection. A multi-purpose push button can be used for Emergency Acknowledge or other custom features. The tag can be provisioned to personnel using built-in NFC. Emergency notification to user with a vibration motor, strong LED and buzzer.

2. Functionality

In operation mode, the tag is reporting AP/BLE readings by scanning WIFI APs and BLE beacons to the configured broker. Scan duration and interval for BLE is configurable and by default one second and five seconds respectively. The report interval is by default 10 seconds but can be configured to any value above three seconds. In between the reporting of AP/BLE readings, the tag is sleeping and will wake up on network activity or pressed button. Accelerometer is used to detect any movement and in the absence of movement, the tag will decrease the report interval to 10 minutes.

2.1 LEDs

Short description on how the LED is used follows here:

- A tag connected to a charger has **yellow** led on when charging and **green** when fully charged.
- A tag that is active (movement detected) and connected to the network will blink **short green** when waking up from sleep.
- A disconnected tag blink **short red** on wakeup
- A tag that is connected to the network and inactive (no movement detected) will blink **short yellow** on wakeup
- When successfully connected to network, the tag is blinking **green four times**
- When starting an over the air update (OTA), a **yellow** led is turned on and **blinks green** after successful OTA
- If BLE firmware is downloaded, the **blue** led turn on during installation of firmware and turn **green** on successful or **red** on failure

2.2 OTA updates

The tag performs OTA updates after a factory reset or on a periodic interval, default is 25 hours. During the OTA, the tag requests the backend if there is any new configuration, new files or new firmware to be downloaded. If yes, the files are downloaded and saved/installed, if no, the tag go back to normal operation mode

To add or change profile for a tag, go to the Profile tab in the admin pages, see section 3.1.2. And add/change profile, remember to assign the profile to the tag by specifying MAC-address. During a OTA, no other tasks are performed such as BLE or AP scanning/reporting. Time spent on OTA depends on resources in backend available for download, approximated time spent is listed below

- No update/profile: ~a few seconds

- WIFI Software/certificates: Up to 5 seconds
- BLE Software: ~1 min including installation of software onto the device

When updating BLE software over OTA, the USB must be disconnected.

2.3 Emergency

Emergency mode is by default enabled on the tag. When an emergency is triggered in Mobilaris Emergency Support, the tag receives a notification. The tag then sends a delivery message notifying that the emergency message has been received to the tag. Then the tag starts a vibration, a buzzer and a stronger white LED, to notify the user that there is an ongoing emergency. By pressing the button, the user sends an acknowledge message to the emergency application and the vibration/buzzer and white LED stops after the acknowledge message has been sent.

2.4 Alarm

When an Alarm is sent from the Zone Based Messages feature in the Mobilaris Situational Awareness application, the alarm is triggered in the tag. The alarm signal is the vibration motor and buzzer running in a periodic sequence and a white/blue LED sequence. By pressing the button, the tag will stop the alarm signal.

3. Initial Deployment

The default configuration after manufacturing makes the tag connecting to the Network name (SSID) “Epiroc-tag-wifi” with Password “Error-Grumbling9-Chevy”. When successfully connecting to mobile Hotspot running Mobilaris TagConfig, the tag connects to the server in the TagConfig application and downloads initial configuration and certificate needed to connect to the onsite SSID and cluster.

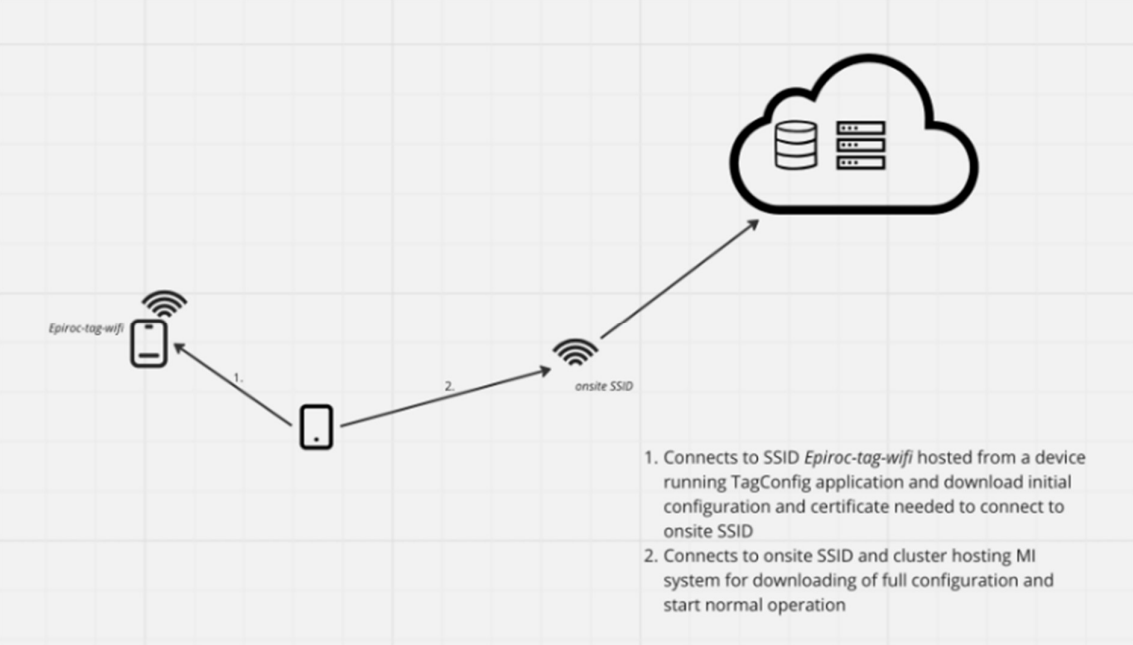

Figure 1 - Deployment procedure overview

3.1 Deployment procedure

This section describes how to deploy Mobilaris Companion Wifi tags using the Mobilaris TagConfig application running on an Android device.

3.1.1 Prerequisite

- Android device with Mobilaris TagConfig installed and possibility to enable mobile Hotspot
- Parameters for SSID, Password for SSID, domain name and certificate to access the cluster hosting the Mobilaris Mining Intelligence™ system
- Charged Companion Wifi tag Connected to a charger (USB or charging panel)
- Default tag configuration (profile) added in Mobilaris Mining Intelligence™ Admin page, **see section 3.1.2**.

3.1.2 Procedure

Go to Mobilaris Mining Intelligence™ Admin page. Under **Positioning Devices -> Wifi Tags -> Profiles**, create a new profile by pressing *New* **(1)** or edit an existing profile by pressing **(2)**.

Update parameters under tabs "General" and "Companion Wifi", figure 3.

Select a default profile that tags connecting to Mobilaris Mining Intelligence™ will get, press the arrow besides the *Default profile* **(3)** and select the profile you want as default.

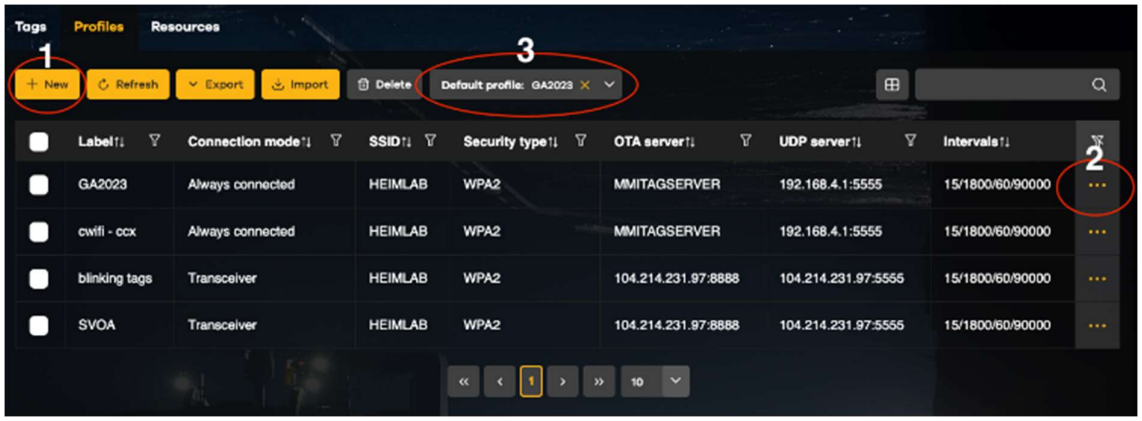

Figure 2 - Mobilaris Mining Intelligence™ Admin page

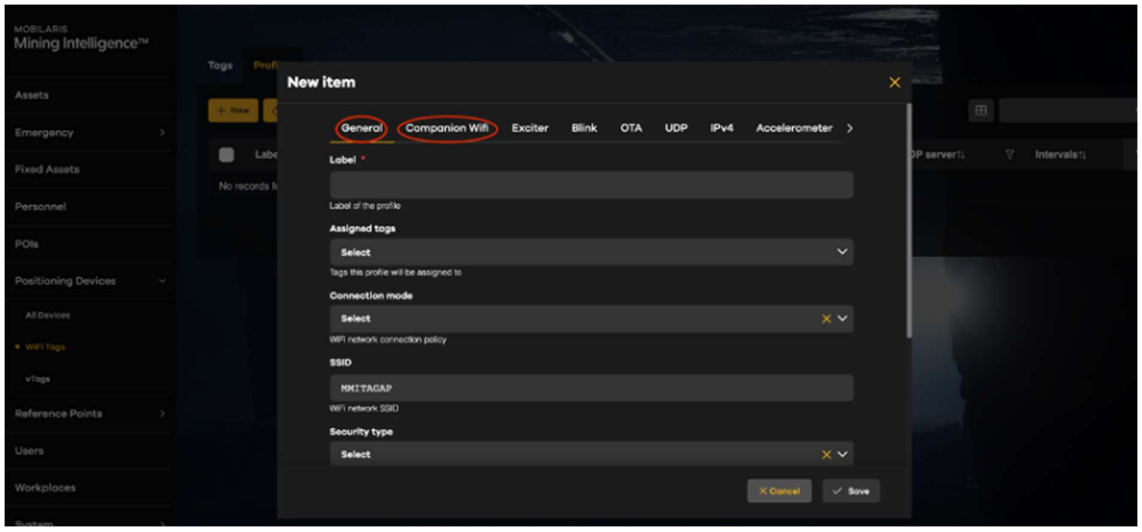

Figure 3 - Mobilaris Mining Intelligence™ New profile

Open Mobilaris TagConfig on your Android device and choose button CONNECTED TAGS.

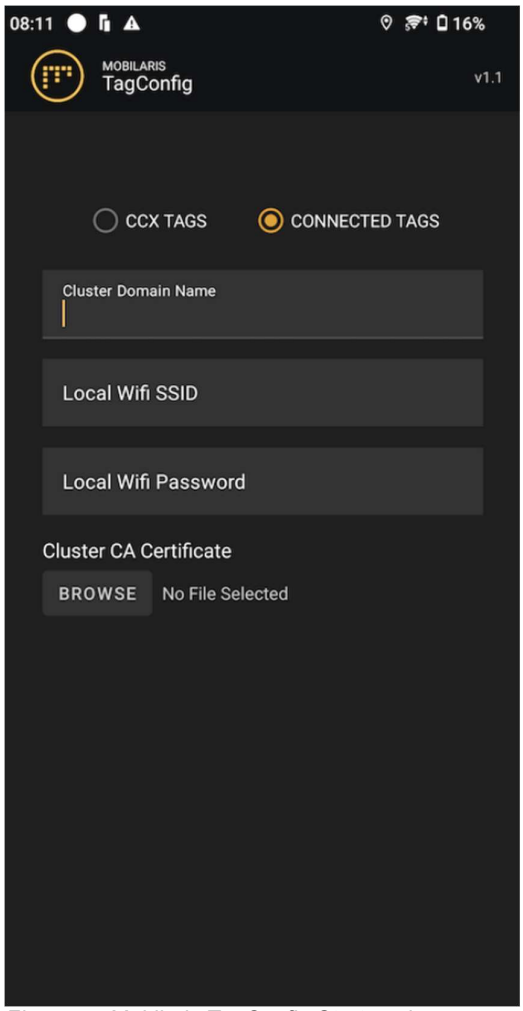

Figure 4 - Mobilaris TagConfig Startup view

Fill fields with requested parameters and add certificate. **Note:** “Cluster Domain Name” should be domain name without a prefix like *domain-name.com*.

Press “Start”. If Hotspot is not enabled, you will be asked to enable the Hotspot as shown in figure 5.

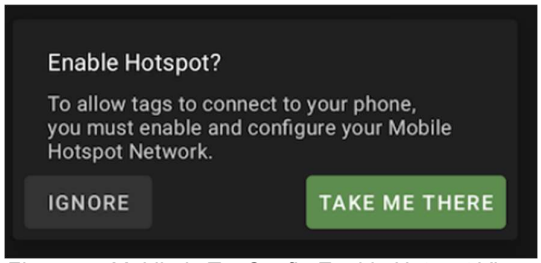

Figure 5 - Mobilaris TagConfig Enable Hotspot View

Enable Hotspot on your mobile device with credentials:

Hotspot Name (SSID): Epiroc-tag-wifi

Password (SSID Key): Error-Grumbling9-Chevy

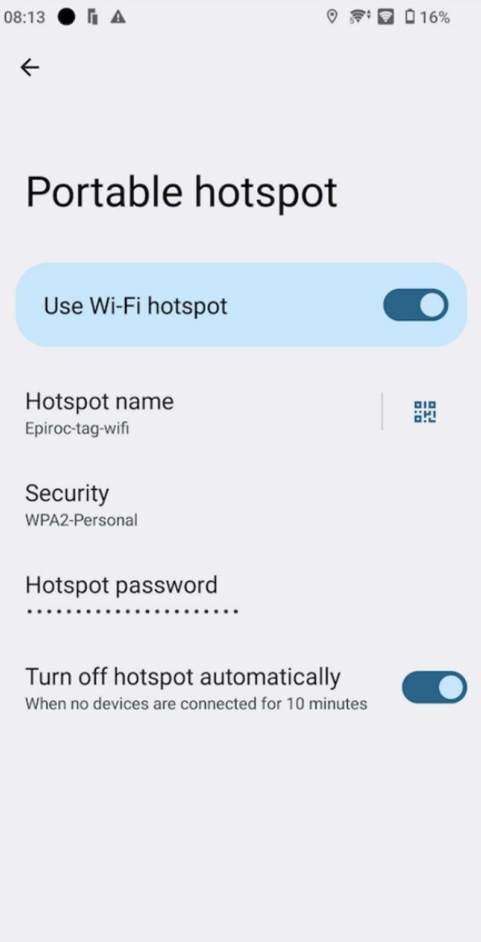

Figure 6 - Mobile device Hotspot settings

Return to TagConfig and you will now see the deployment view, figure 7.

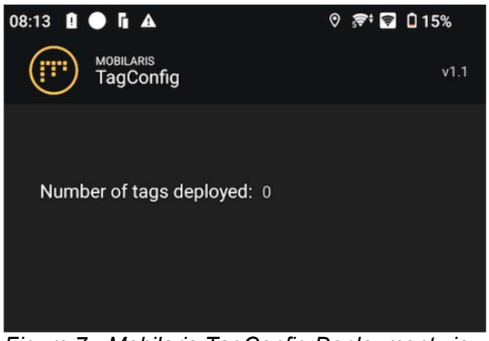

Figure 7 - Mobilaris TagConfig Deployment view

If the tag is new from factory the tag will automatically connect to the Hotspot if the tag is charged and

connected to a charger. If the tag is being redeployed in a new environment the tag needs to be reset, see section 3.2. The tag will vibrate when successfully reset and after a while connect to the Hotspot.

Once the tag is connected to the Hotspot it will start downloading initial configuration (profile) and certificate. During this process, the tags MAC-address is shown in the application as shown in figure 8.

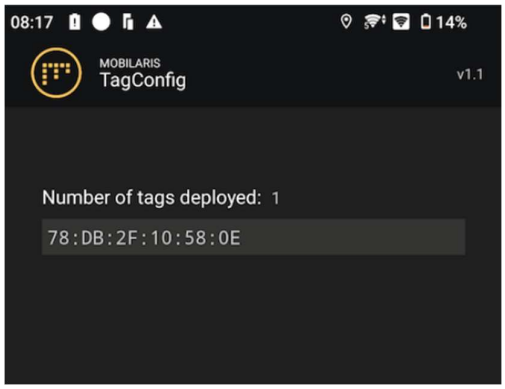

Figure 8 - Mobilaris TagConfig connected tag view

When tag is done with the download, the MAC-address turns green, figure 9. Tag will now disconnect form the hotspot and connect to the onsite network (SSID) and cluster to download the profile that's been prepared earlier in the Mobilaris Mining Intelligence™ Admin page.

The tag will now be visible in Mobilaris Mining Intelligence™.

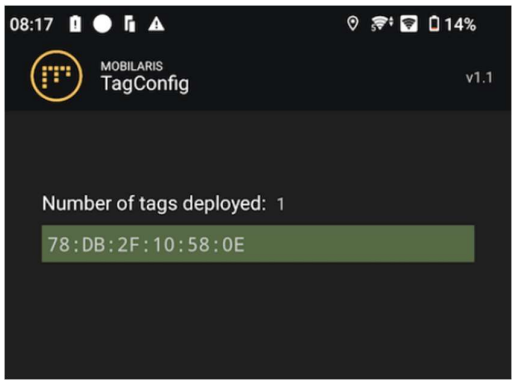

Figure 9 - Mobilaris TagConfig successful deployment view

After a while tags MAC-address turns grey and is removed from the list. Counter shows the number of tags deployed in this session.

3.2 Factory reset of tag

To reset tag:

1. Connect USB charger
2. Press button under the plastic casing. The reset button is located as marked in the figure 10 below
3. After a successful reset, the tag will run a short vibration sequence.

Figure 10 - Mobilaris Companion WiFi reset

3.2.1 Configuration options

Parameters on the Companion Wifi Tag that can be configured from the Admin pages.

- **SSID:** WiFi network SSID tag connects
- **Security Type:** WiFi network encryption, Open, WEP or WPA2
- **Security Key:** WiFi network password
- **Domain name:** Domain name to broker and backend. Should be domain name without a prefix like domain-name.com
- **Report interval:** Report interval of WIFI/BLE readings to broker, in seconds
- **Maintenance interval:** Period between two OTA opportunities, in seconds
- **Telemetry interval:** Interval of telemetry reporting to broker, in seconds
- **AP RSSI Threshold:** Lower RSSI threshold for reporting AP reading, in dBm
- **BLE scan period:** Interval of BLE scans, in seconds BLE scan duration: Duration of a BLE scan, in 1.28s unit
- **BLE filter:** Enable/Disable BLE scan filter
- **TLS enabled:** Enable/Disable secure communication
- **NTP server:** NTP server for time synchronization, leave empty to use default
- **CSI Enabled:** Use CSI
- **CSI Token:** Use CSI token, leave empty if using default
- **Emergency Enabled:** Enable emergency on device
- **Broker user:** Username for connecting to broker, leave empty to use default
- **Broker password:** Password for connecting to broker, leave empty to use default

Abbreviations

AP – Access Point

BLE – Bluetooth Low Energy

LED – Light Emitting Diode

NFC – Near Field Communication

OTA – Over The Air

SSID – Service Set Identifier

USB – Universal Serial Bus

WiFi – Wireless Fidelity

Revision History

Rev	Date	Changed by	Comment
1	2024-02-09	Adam Strandelin	First issue
2	2024-02-16	Adam Strandelin	Updated FCC statement

Epiroc Rock Drills AB
SE-972 42 Luleå,

Sweden

epiroc.com