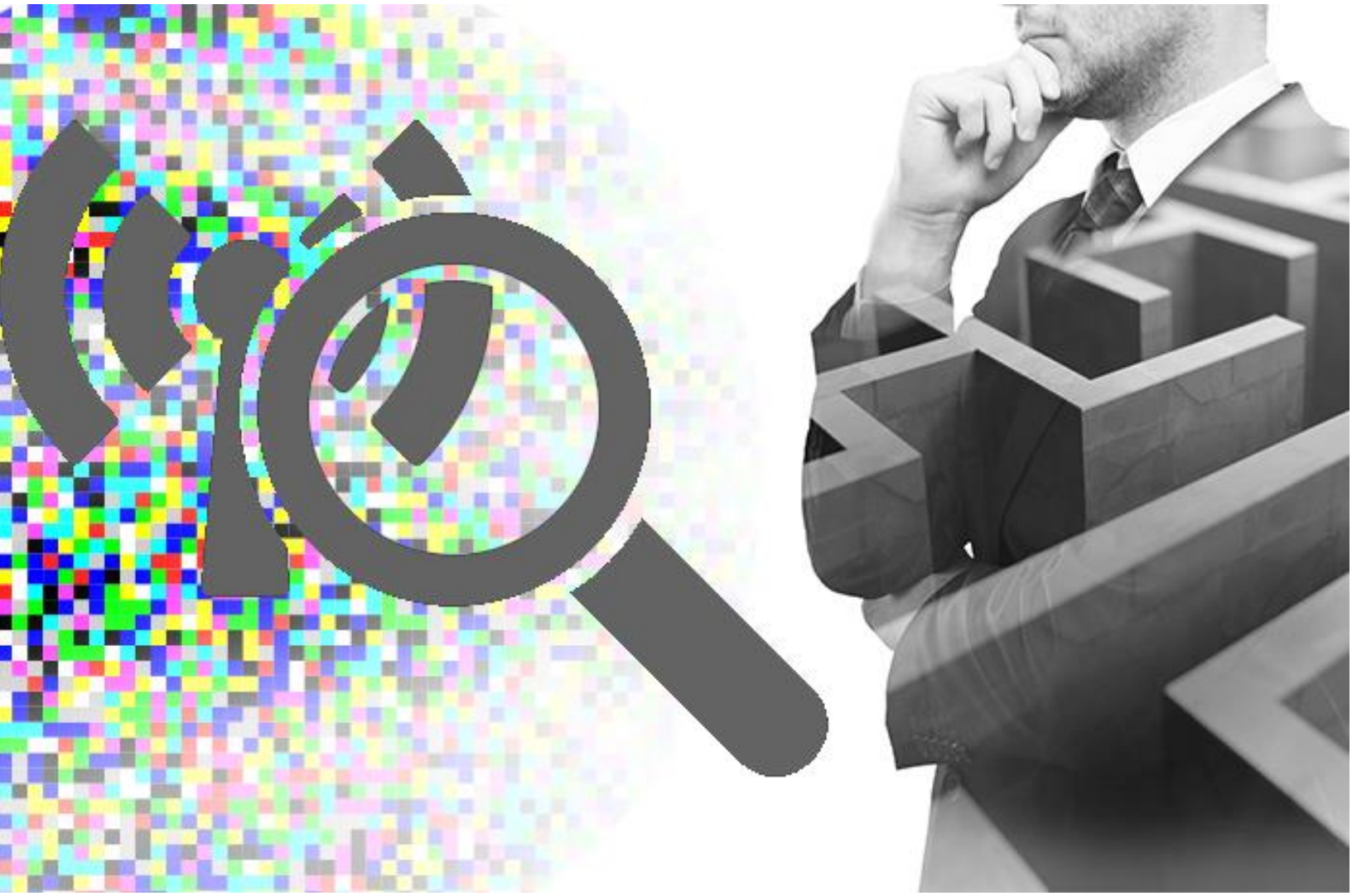


How to use the WM-100 and Wave Navigator for troubleshooting

silex technology

When it **Absolutely Must** Connect

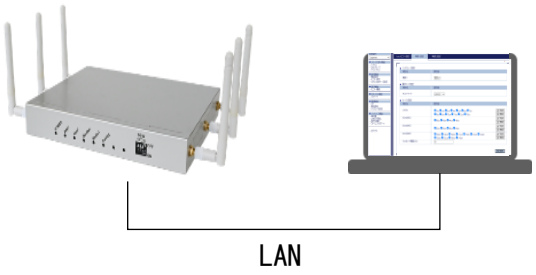
Contents

0. Pre-requisition

This document is to explain

- data monitored by the WM-100 and Wave Navigator, and
- How to use the data

Refer to “How to install the WM-100 and Wave Navigator” (“Installation Guide”) document for the installation process of the system. The Installation Guide is to connect the WM-100 to a computer directly, as below.



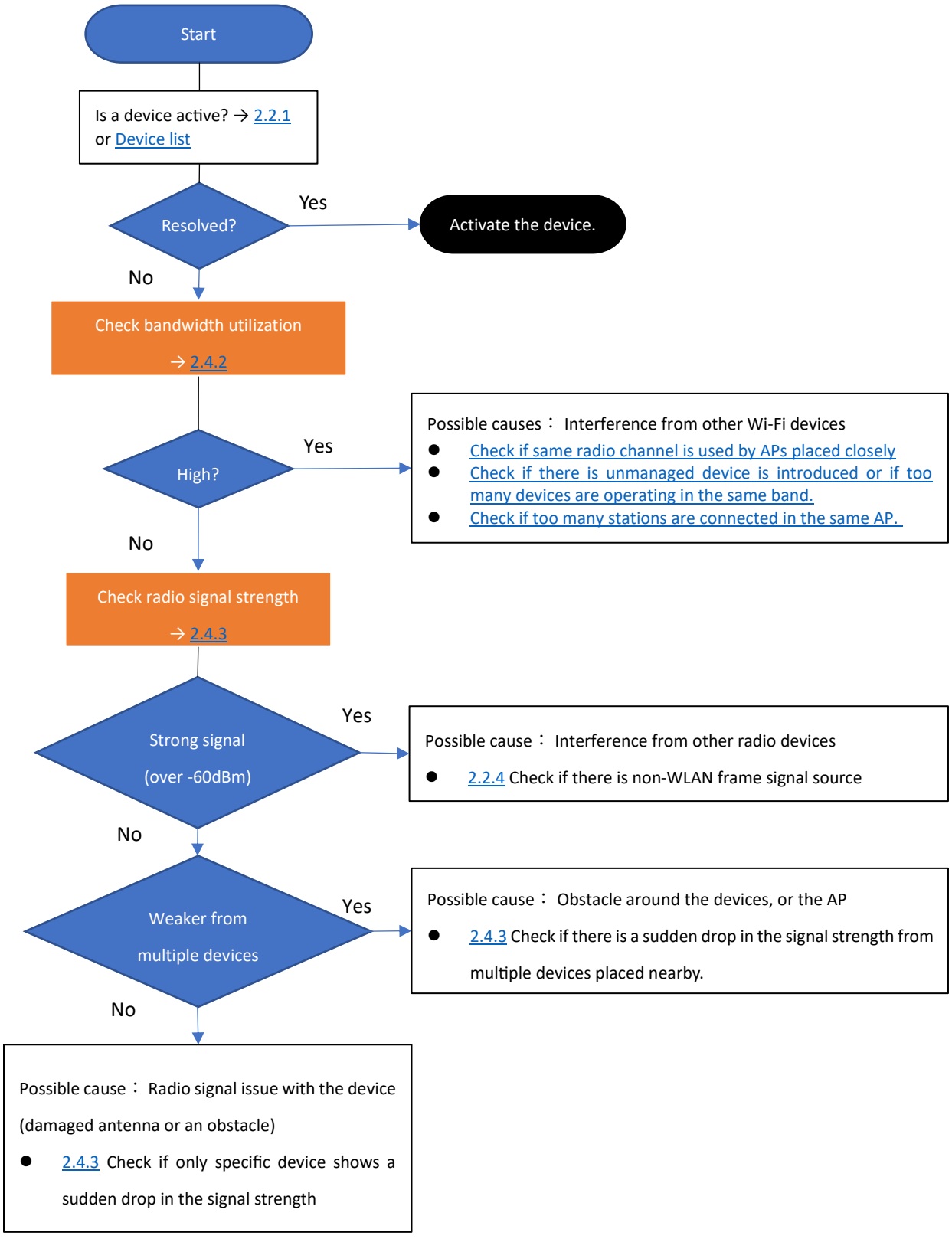
Computer	
OS	Windows Server 2016（64bit） Windows 10 IoT Enterprise（64bit） Windows 10 Professional（64bit）
CPU	Intel Core i5 or higher performance CPU
Memory	4 GByte and more available for the Wave Navigator software
HDD/Storage	1 TByte and more available for data storage

Firewall setting

Ports in use	3000、8080、8086、8090
Applications in use	Apache、Python、NginX、Grafana、InfluxDB (These will be installed during Wave Navigator installation.)

1. How to use data for WLAN troubleshooting

1.1 Wireless radio signal issue

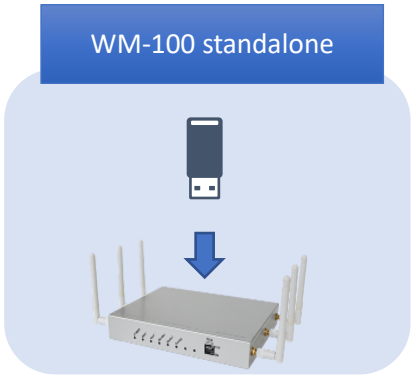


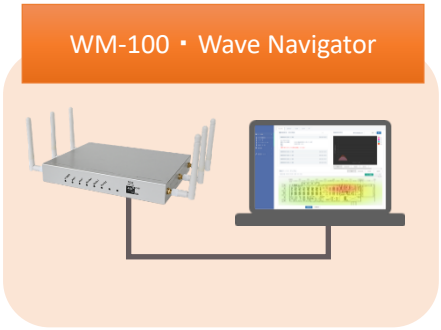
1.2 Wi-Fi link association issue

If there is no issue identified but the Wi-Fi link is not established between an access point and a station, it may encounter a Wi-Fi authentication issue. In this case, wireless packets capturing is the powerful tool to identify a packet level issue.

The WM-100 can be used as the packet capture tool and it transfers the data to the Wave Navigator. It can also store the captured data into an USB drive.

Section 3 explains how to capture the wireless packet with the WM-100 and the Wave Navigator.



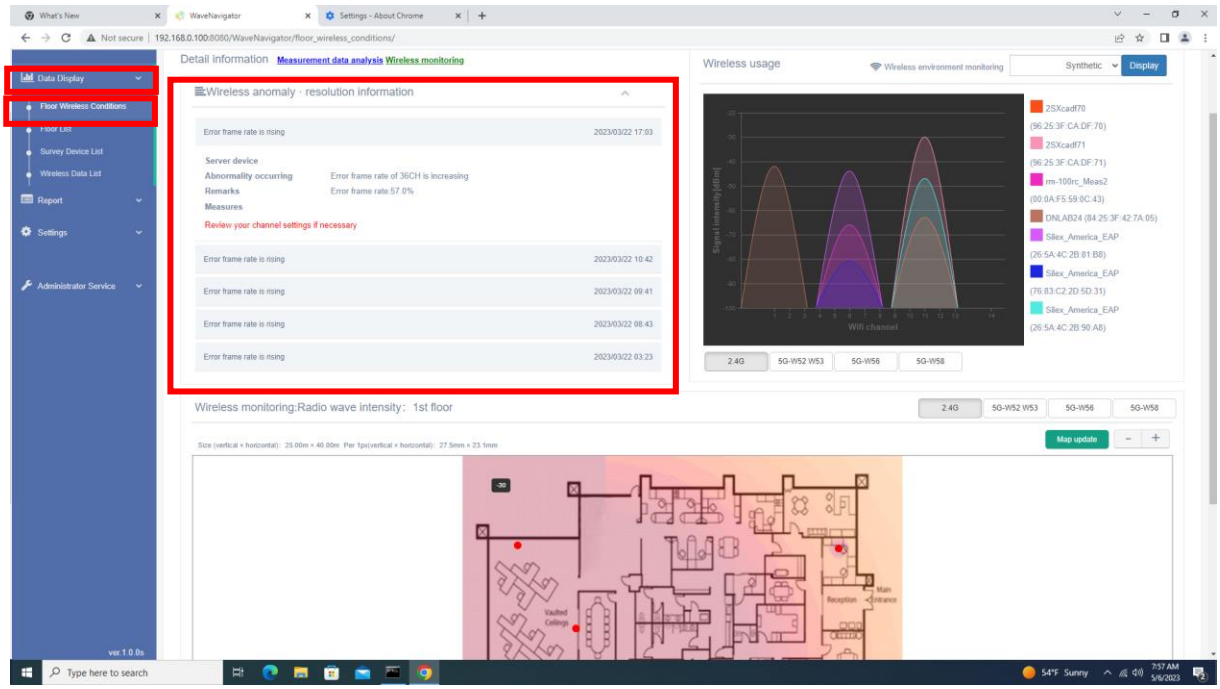


2. Data monitored by the WM-100 and Wave Navigator

2.1 Floor Wireless Conditions

The “Floor Wireless Conditions” page is a dashboard showing useful information indicating the status of managed wireless devices such as Wi-Fi access points and stations.

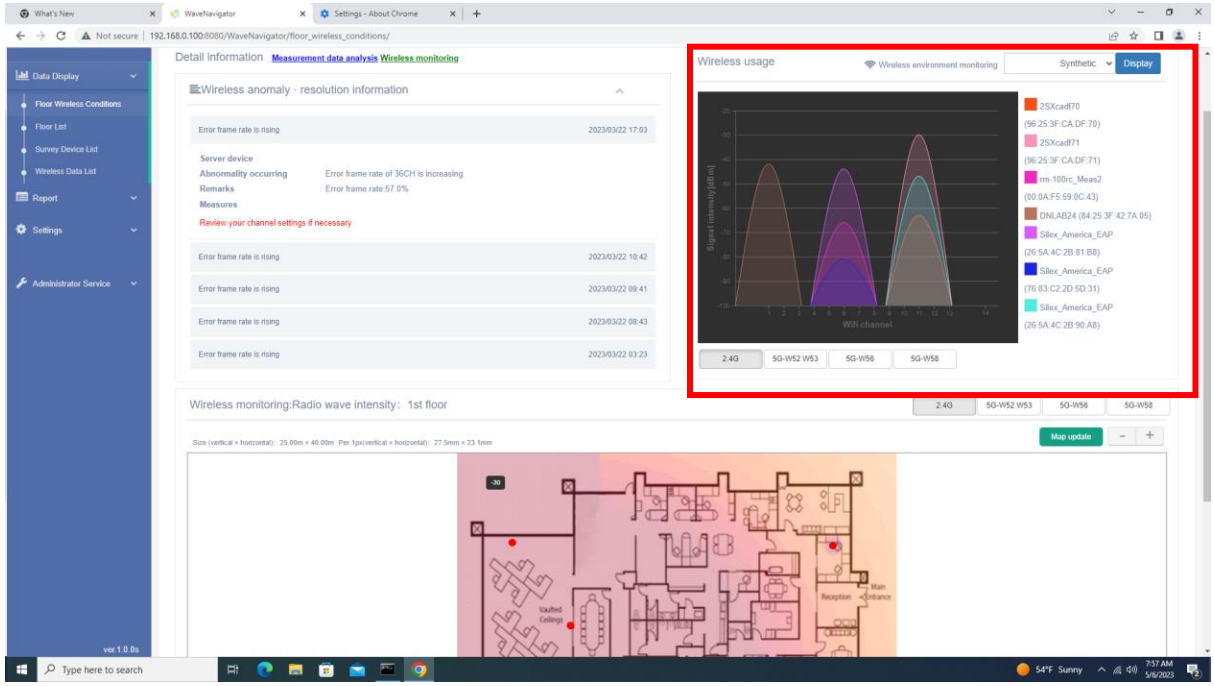
2.1.1 Wireless anomaly – resolution information



This page section shows the history of alarms in your wireless environment. There are four warning conditions, as shown in the table below:

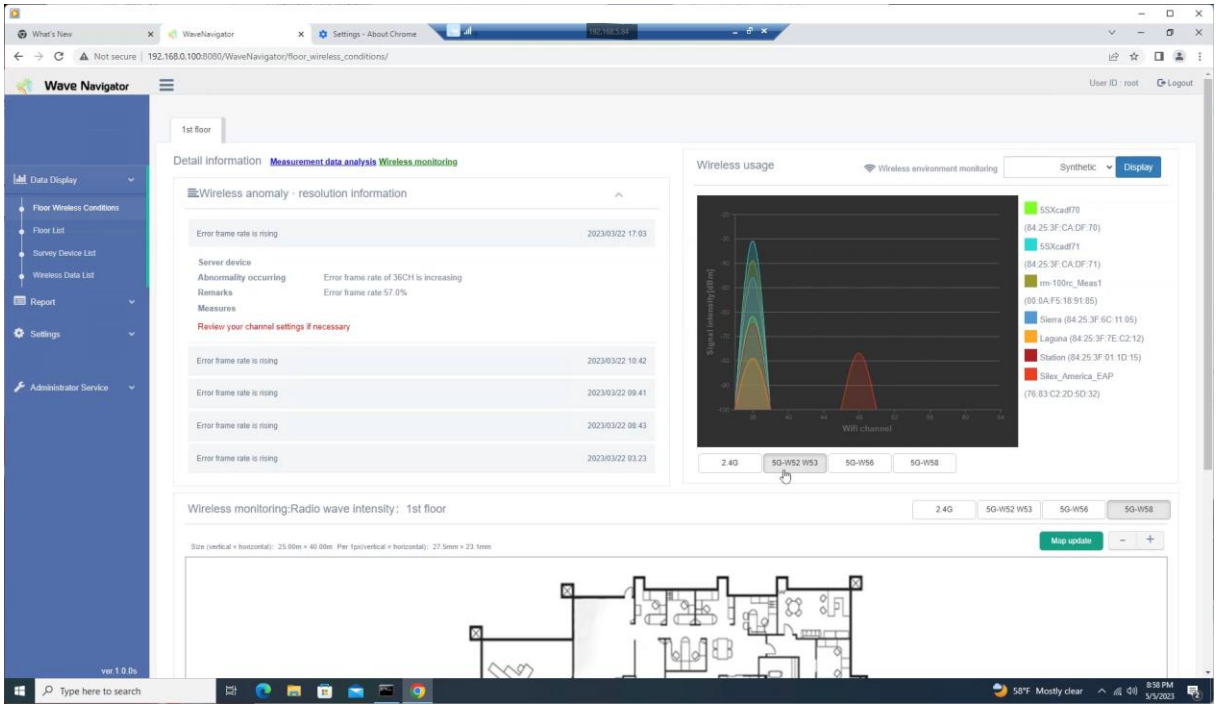
No.	Warning type	Contents	Wording	Measures
1	Increased bandwidth rate	Bandwidth rate is rising	Bandwidth rate of %(channel) is increasing	Review your channel settings if necessary
2	Increased error frame rate	Error frame rate is rising	Error frame rate of %(channel) is increasing	Review your channel settings if necessary
3	Increased resend frame rate	Resend frame rate is rising	Resend frame rate of %(channel) is increasing	Review your channel settings if necessary
4	Reduced signal strength	The signal strength of the device is low	The signal strength of %(machine) is low	Review the antenna status of the device if necessary

2.1.2 Wireless Usage

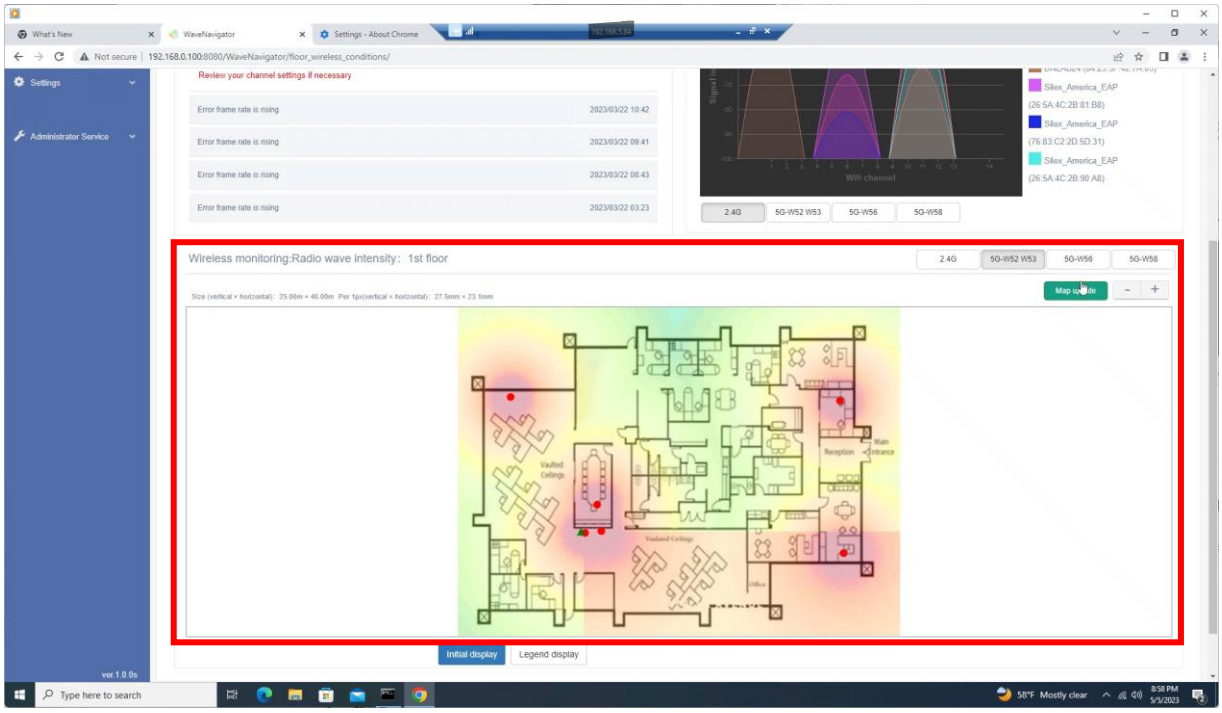


This page section shows the registered devices' signal strength in their operating channel measured by the WM-100. If you find that multiple access points placed nearby operate in the same channel, you may want to change the operating channel of some of them.

You can choose from 2.4GHz, 5GHz W52/W53, 5GHz W56 or 5GHz W58 to display as below.



2.1.3 Wireless monitoring: Radio wave intensity



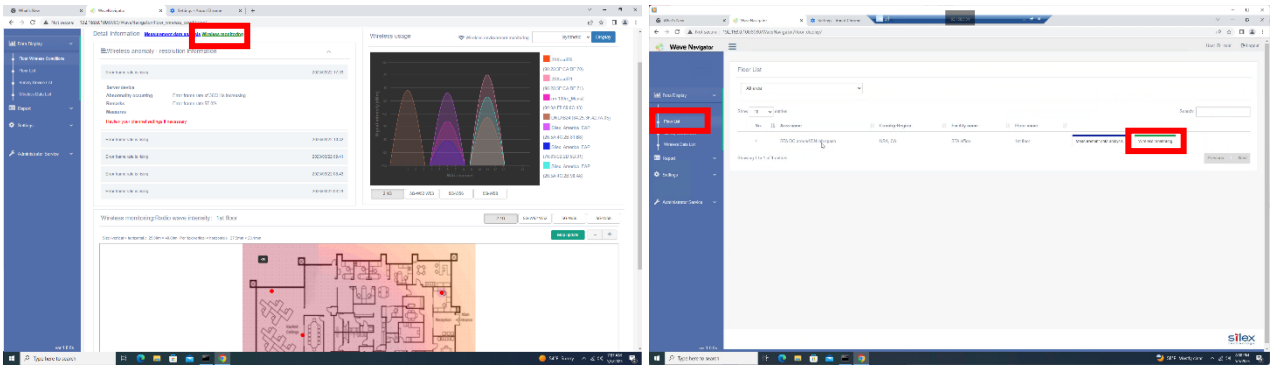
This page section shows the heatmap of the radio signal strength from the registered devices in your environment. The heatmap and channel information help check if the Wi-Fi access points are properly installed to cover the entire floor.

You can monitor the heatmap of 2.4GHz, 5GHz W52/W53, 5GHz W56 or 5GHz W58 radio band.

2.2 Wireless Monitoring

The recent wireless status can be checked on the “Wireless monitoring” page. There are two ways to get to this page.

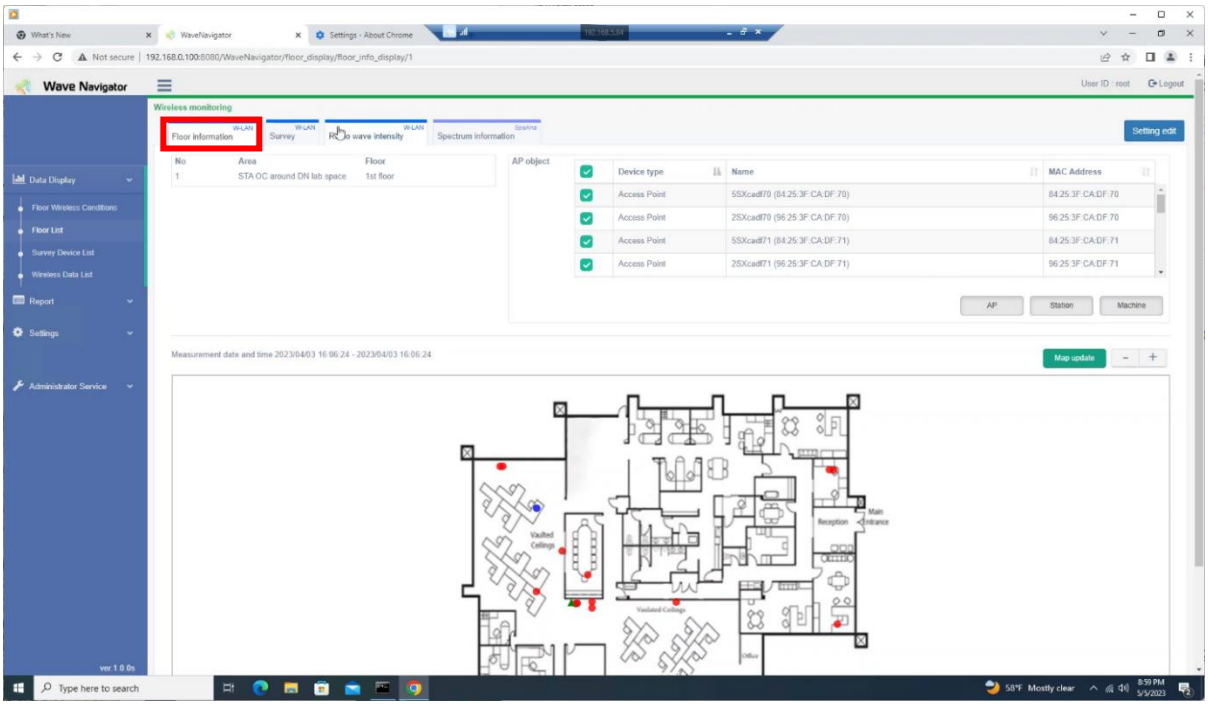
1. “Wireless monitoring” link on the top of the “Floor wireless conditions” page
2. “Floor List” > “Wireless monitoring” of your floor to check



2.2.1 Floor information

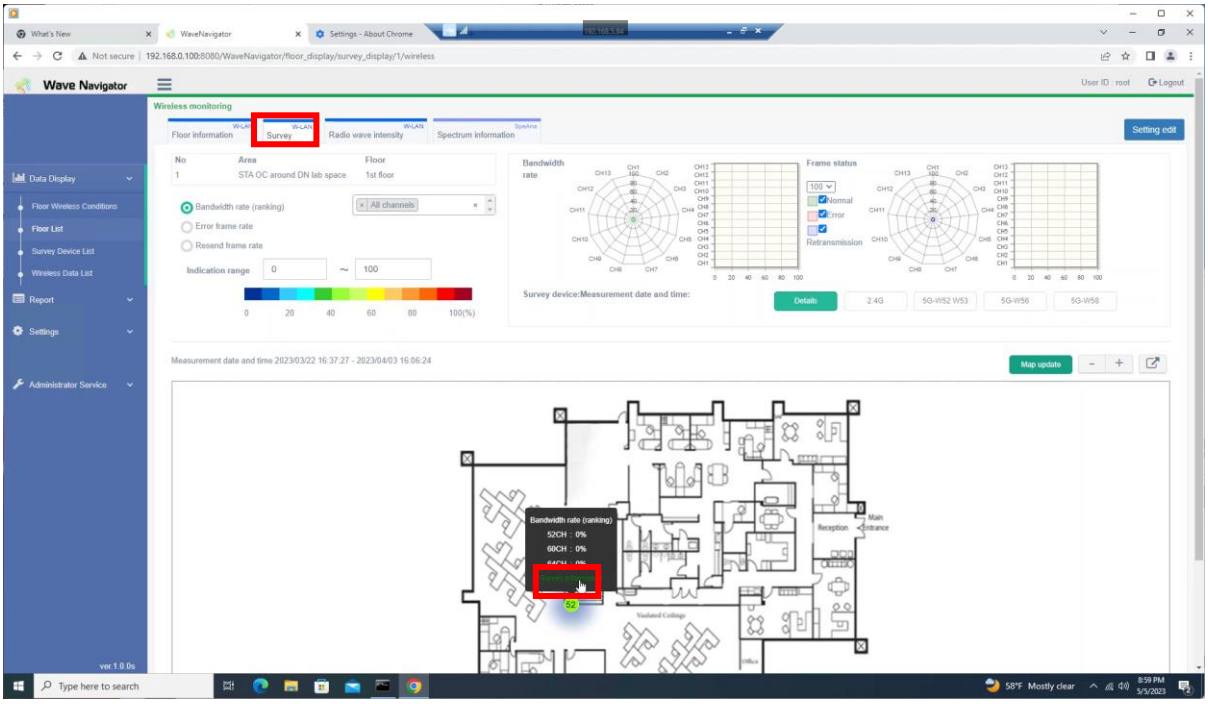
The “Floor information” tab provides the device list and its location on your floor. You can review your setting to see if all devices are correctly registered. If other devices need to be added, you can go to the device registration page by clicking “Setting edit” on the top of the page.

When the mouse cursor points to a specific device on the floor map, the icon blinks if the Wi-Fi communication is active. It does not blink if there is no Wi-Fi traffic with the device.

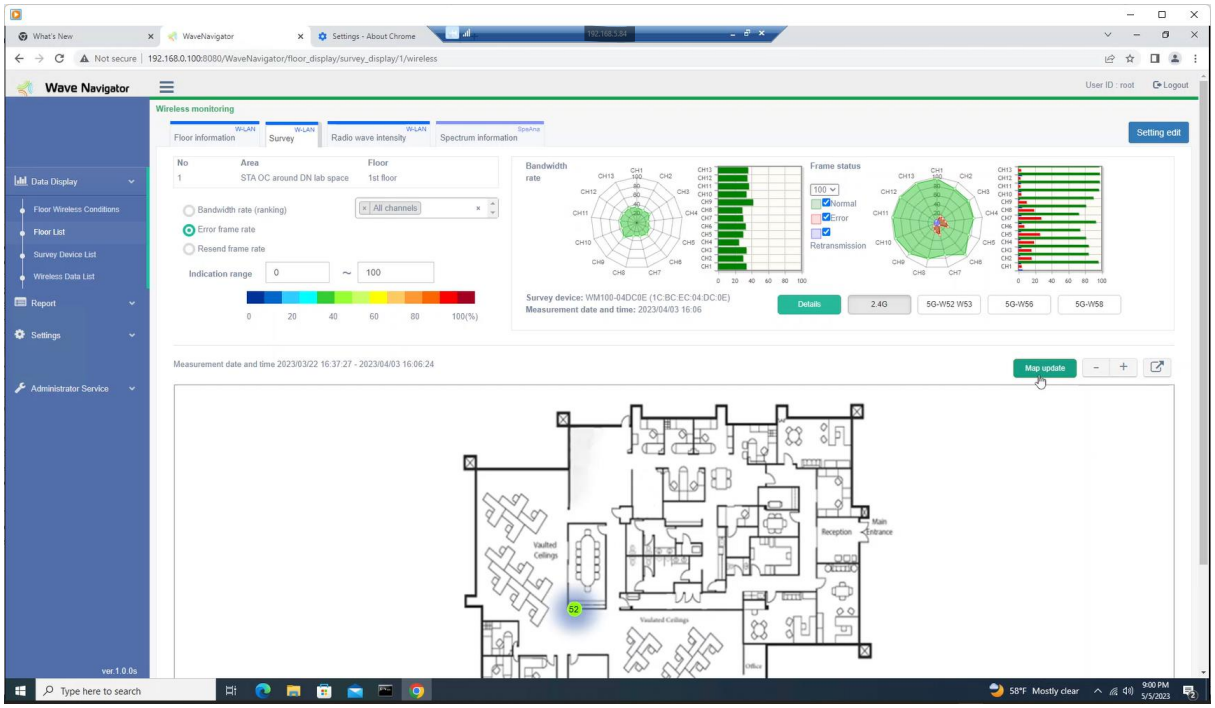


2.2.2 Survey

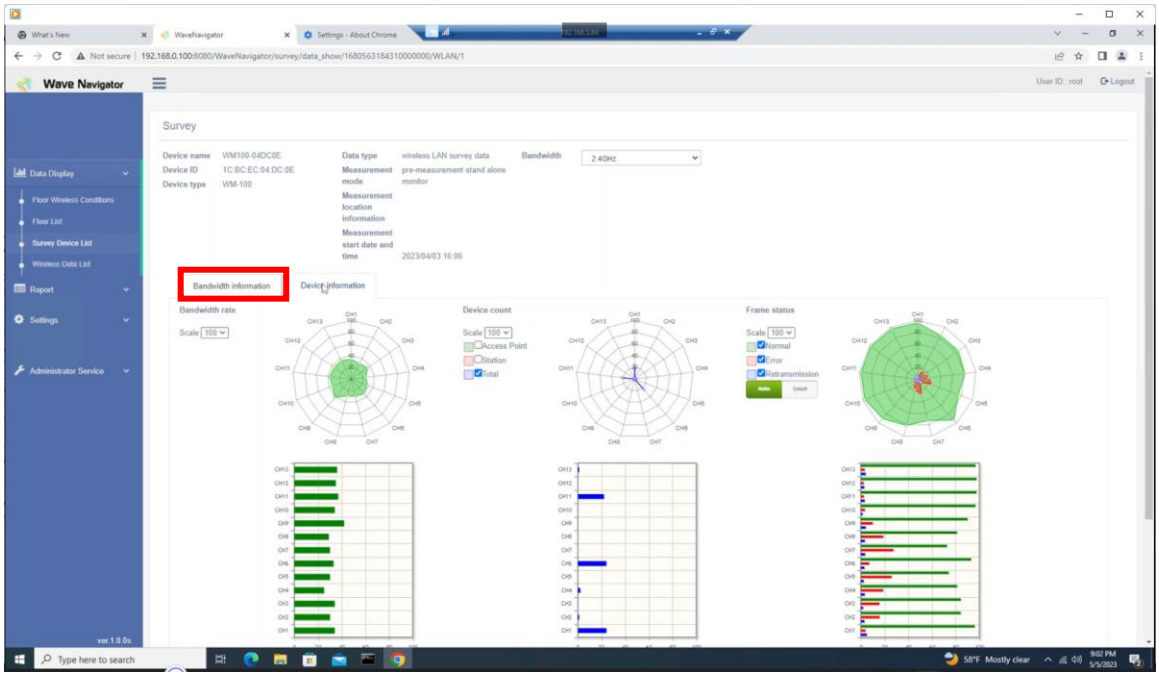
The “Survey” tab shows the bandwidth utilization and the wireless data frame status (normal frame rate, error frame rate, and resend frame rate) of the channels being monitored by a selected WM-100.



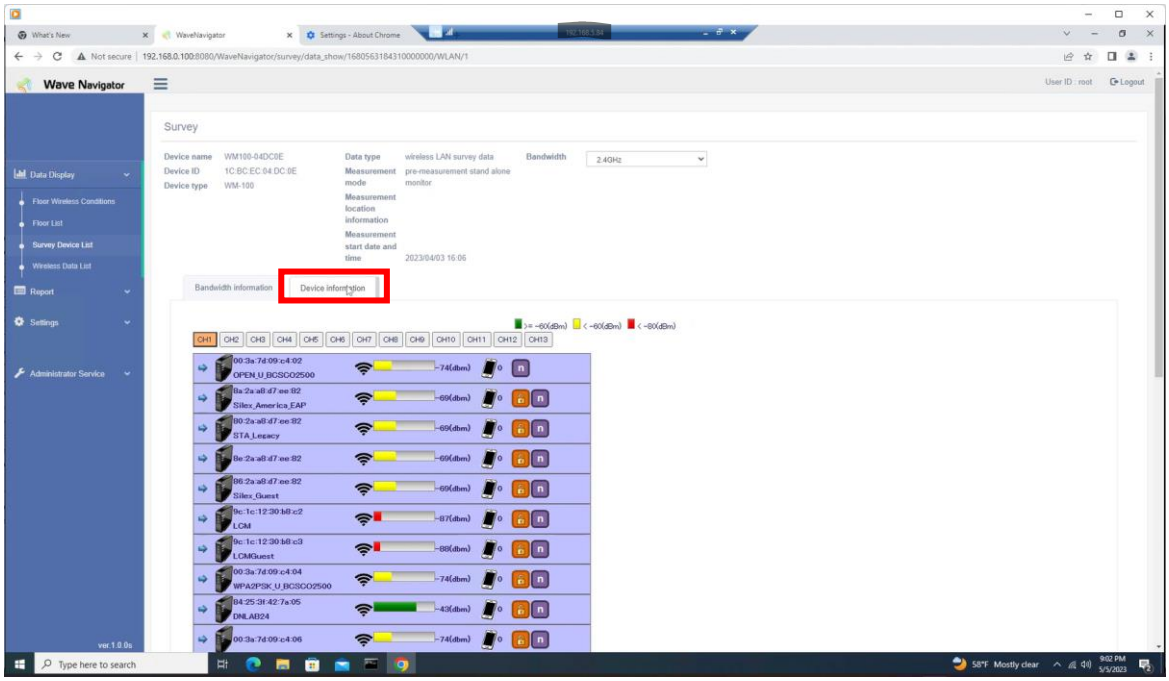
Once “Survey Information” of a WM-100 is clicked, a chart and a graph are shown. These show information on the selected radio band.



The “Detail” button guides you to more detailed survey information. The “Bandwidth information” tab shows the bandwidth rate, the number of devices, and the frame status (rate and count). The bandwidth information guides to adjust the radio channel usage to improve the Wi-Fi communication quality.



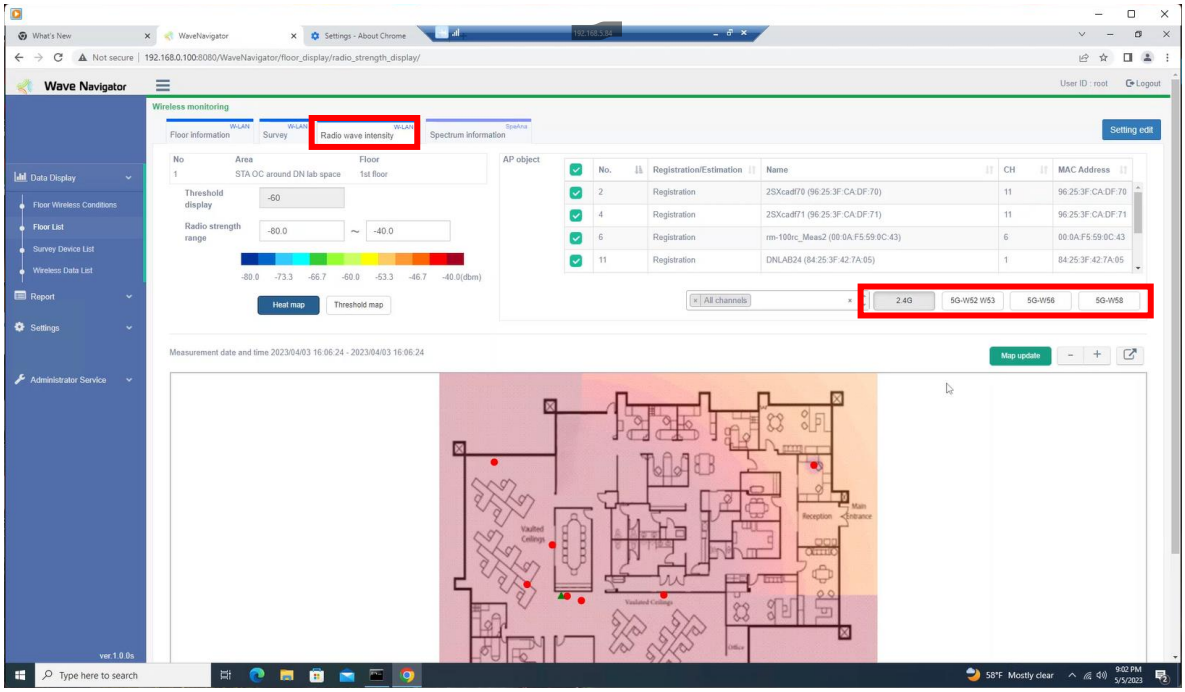
The “Device information” tab shows the access points operating in each frequency. It shows the signal strength detected by the WM-100 and the number of station devices. This information helps recognize any unintentional access points that may cause the unintentional radio emission causing the interference.



2.2.3 Radio wave intensity

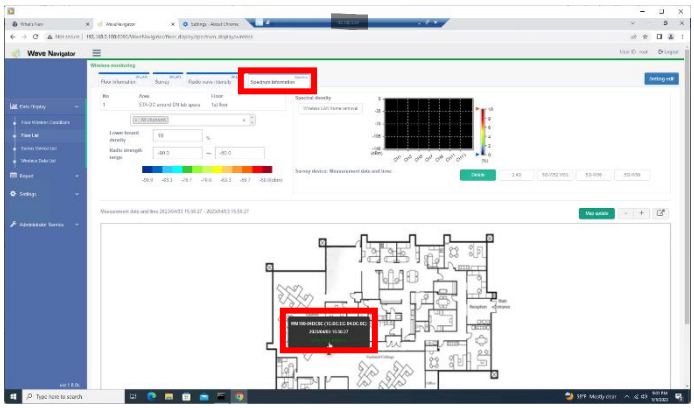
The “Radio wave intensity” tab shows the heatmap of the radio signal strength from the registered devices in your environment. The heatmap and channel information help check if the Wi-Fi access points are properly installed to cover the entire floor.

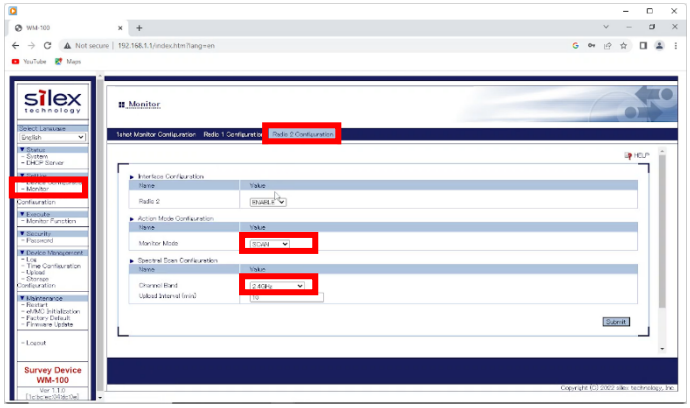
You can monitor the heatmap of 2.4GHz, 5GHz W52/W53, 5GHz W56 or 5GHz W58 radio band.



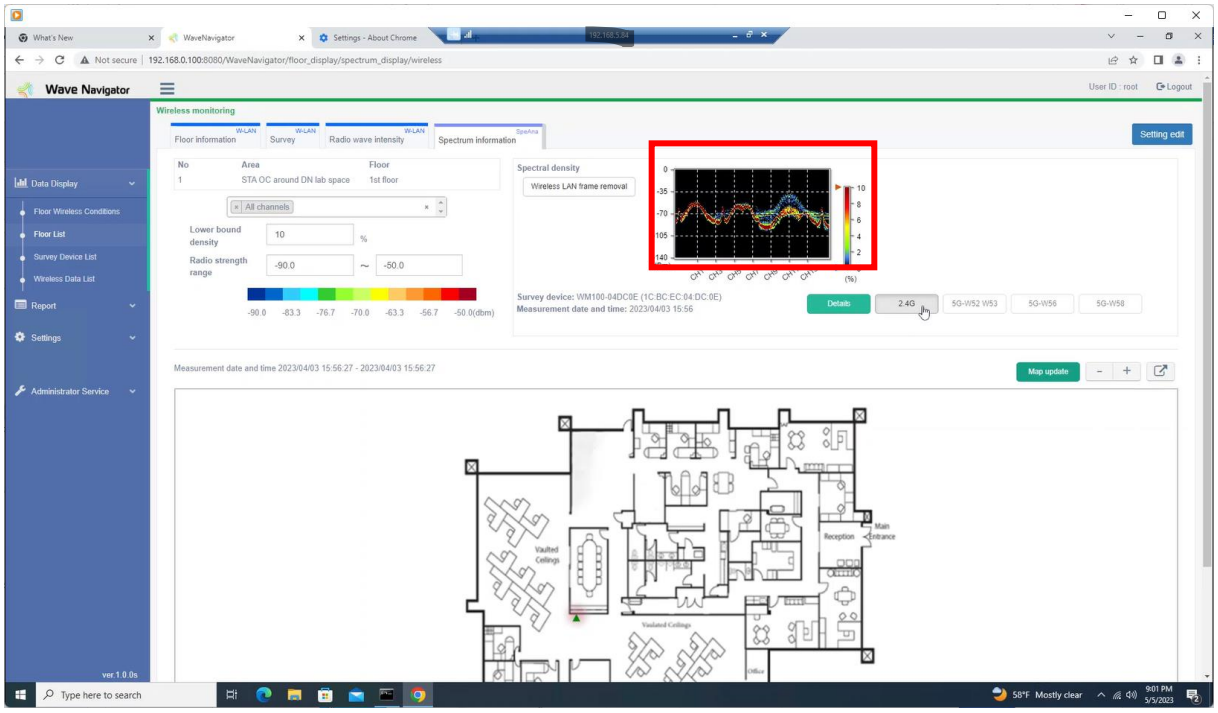
2.2.4 Spectrum information

The “Spectrum information” tab shows the radio signal intensity in the selected radio band. Please ensure the WM-100’s setting to collect spectrum information in a specific band. The WM-100 is configured to collect a 2.4GHz spectrum by default, as shown in the picture below.

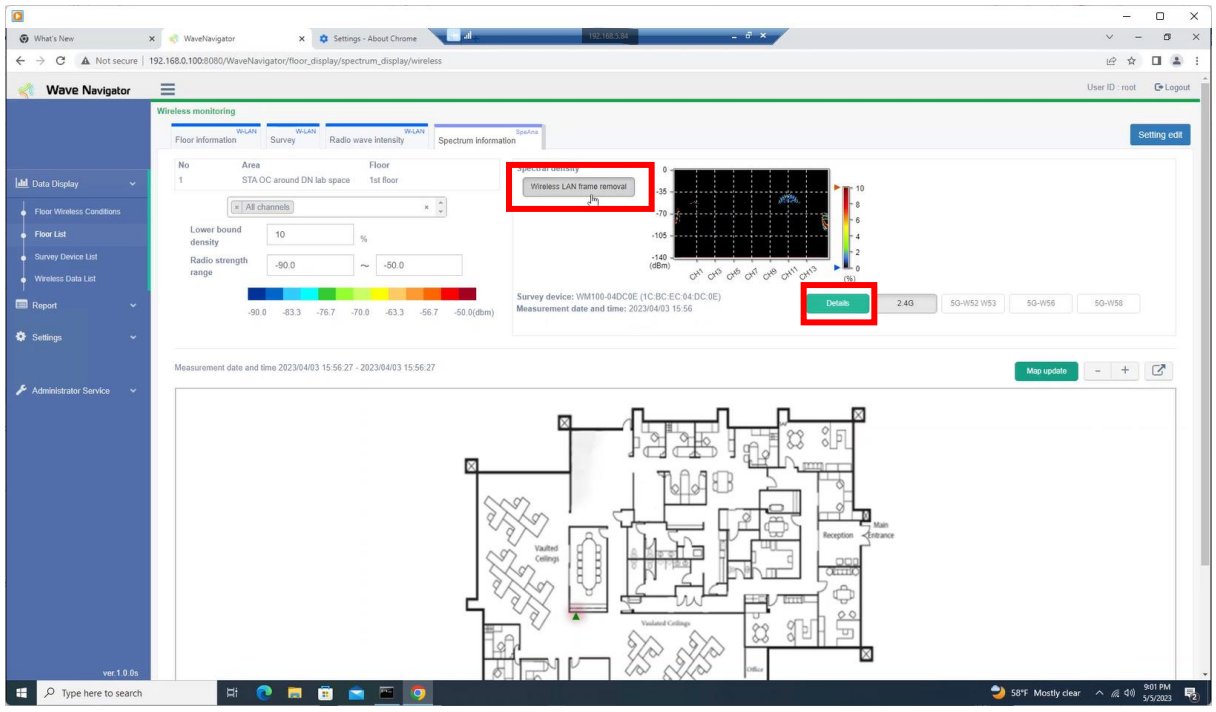




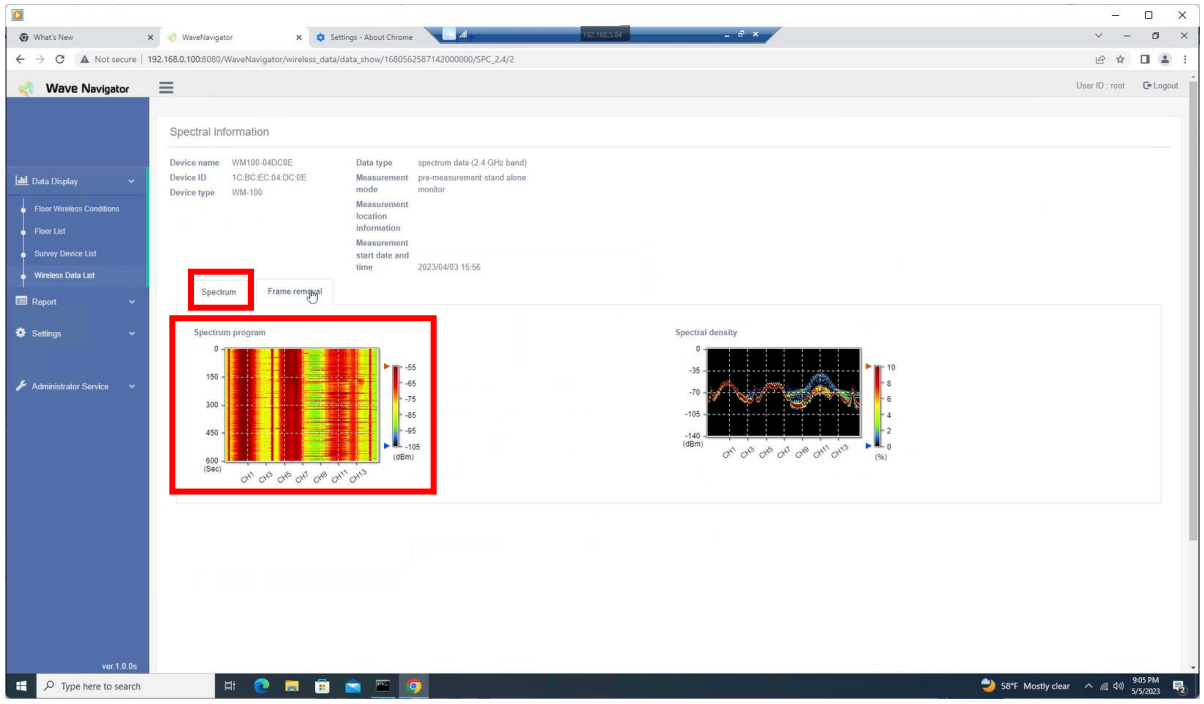
After you click the “Spectrum analysis”, the spectrum information appears. You will know which channel emits the strong signal around the selected WM-100 and how often such a signal is detected.



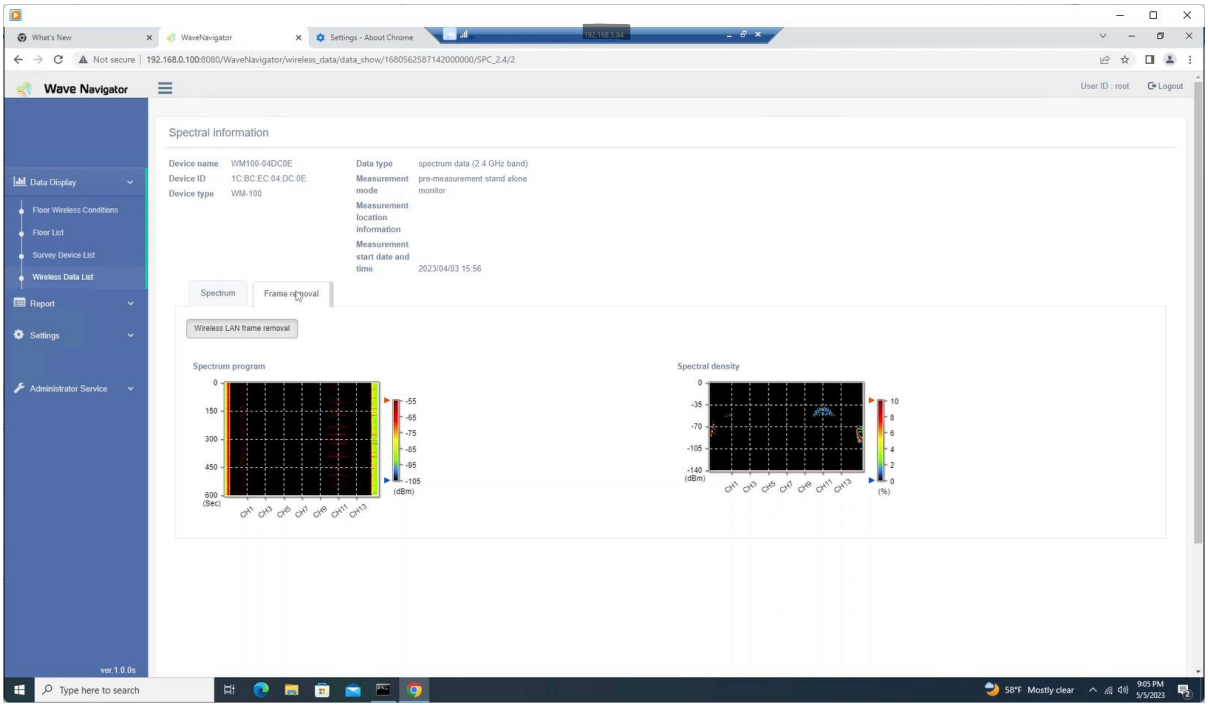
“Wireless LAN frame removal” button is to remove the radio spectrum related to the Wi-Fi communications. It indicates a radio emission source near the WM-100 that can act as the noise to cause interference.



The “Details” button guides you to the page below. It shows the additional information of the radio signal level in the frequency band over time. (In the case of this picture, past 10 minutes data is shown.) If a noise source emits an unintentional signal in the frequency band, such a signal can be captured and displayed in this chart.



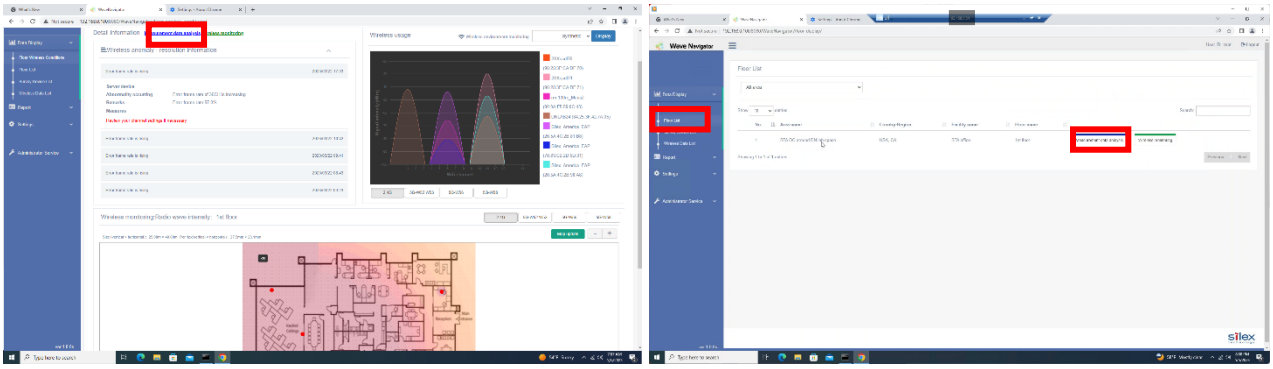
The “Frame removal” tab shows the same chart without the radio signal related to the WLAN frame, non-Wi-Fi radio signal. You will know if there is a noise source that can affect the WLAN quality.



2.3 Measurement data analysis

The site survey result, registered during the setup (Refer to section 6.3 in “How_to_install_wm-100_wavenavigator”), is shown in the “Measurement data analysis” page. There are two ways to get to this page.

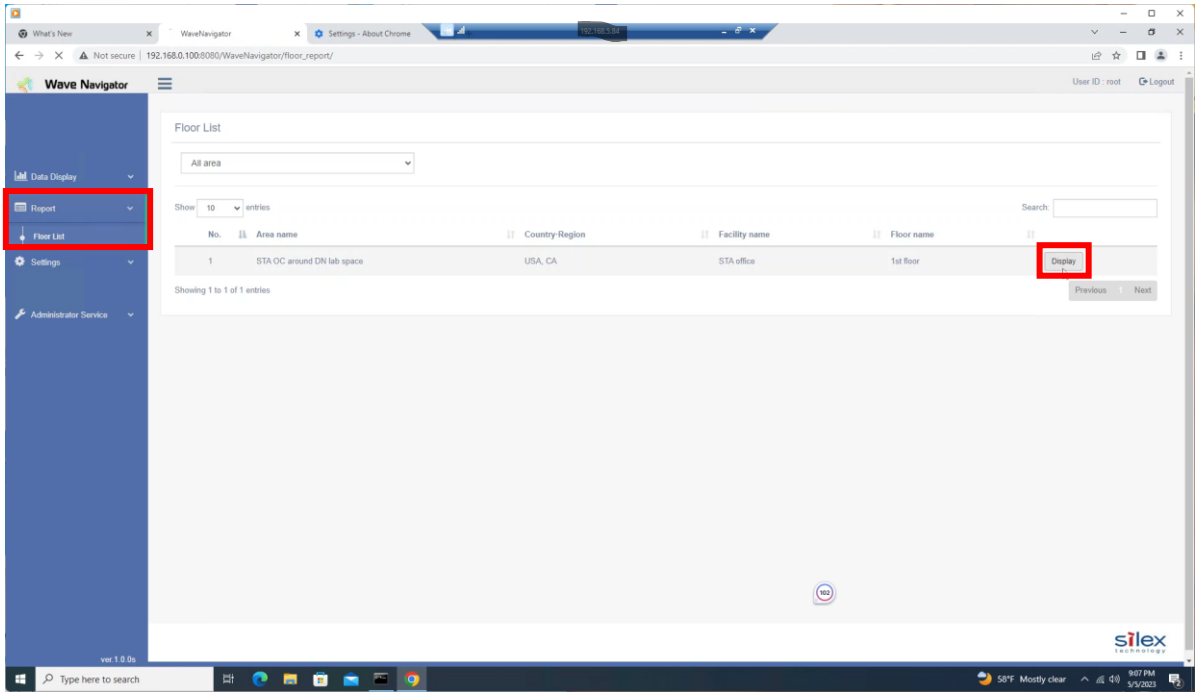
1. “Measurement data analysis” link on the top of the “Floor wireless conditions” page
2. “Floor List” > “Measurement data analysis” of your floor to check



The analysis data consists of the data set described in sections 2.2.2, 2.2.3, and 2.2.4.

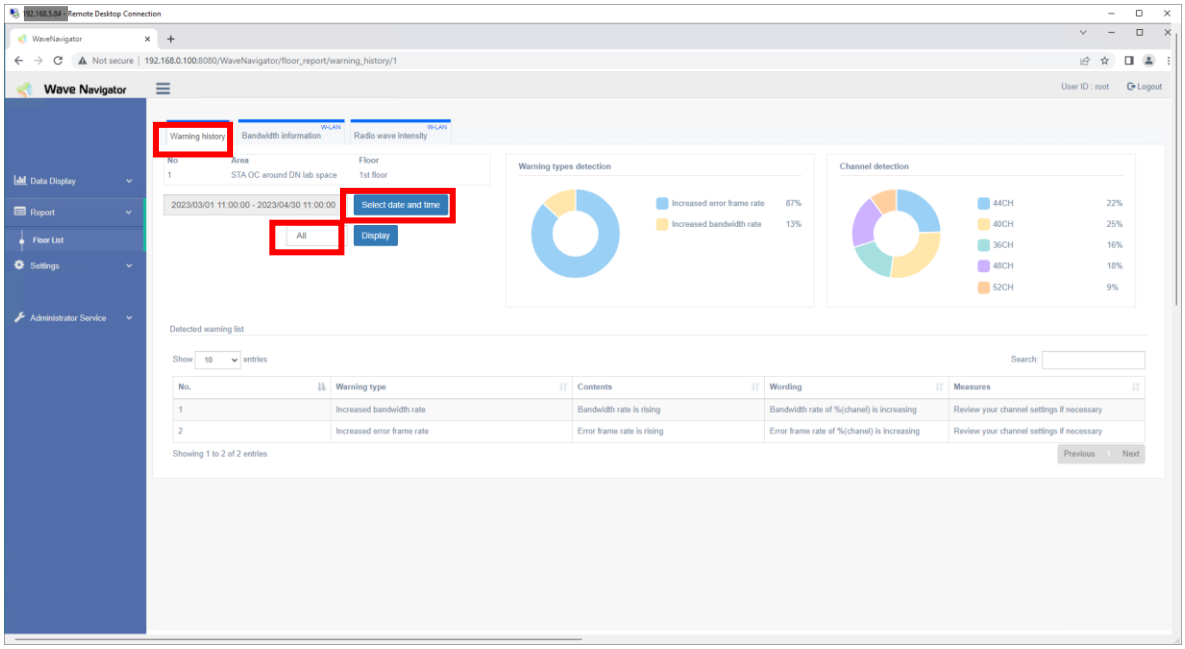
2.4 Report

The Wave Navigator generates a couple of time charts showing your floor's wireless environment status. The reports can be accessed from “Report > Floor List > Display” as below.



2.4.1 Warning history

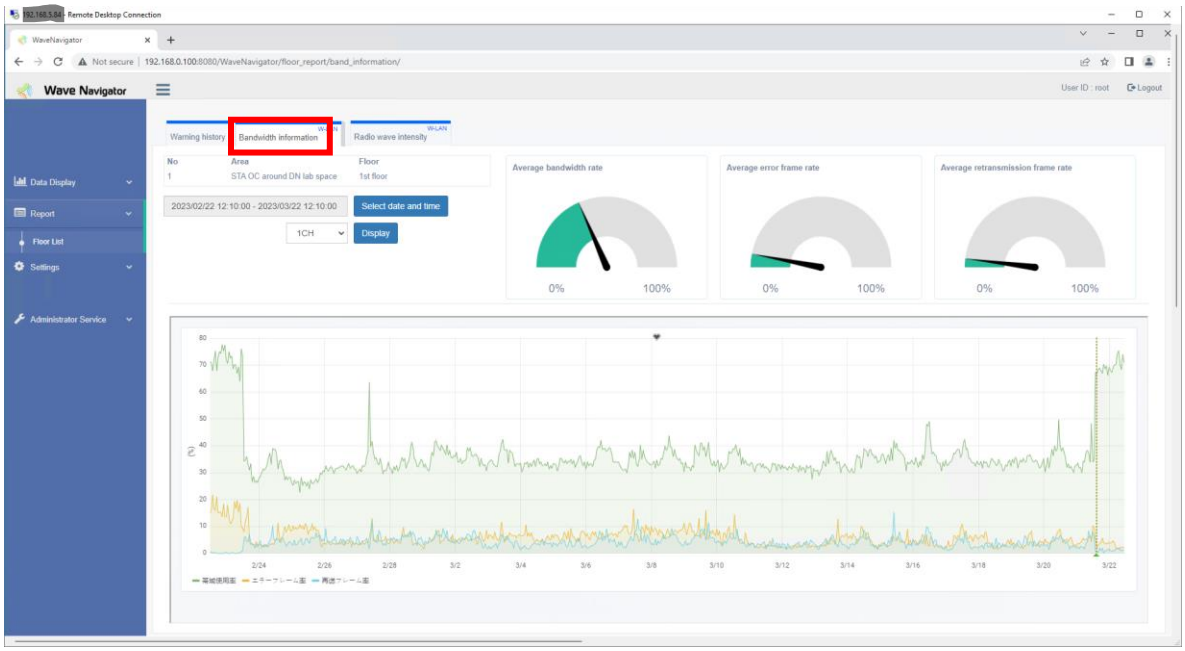
The “Warning history” tab shows the warnings triggered during the period set through “Select date and time.” A specific channel can be selected from the pull-down menu. The information provides some ideas, such as which channels see more potential issues, what issues will happen more likely etc.



2.4.2 Bandwidth information

The “Bandwidth information” tab shows the time chart of following data:

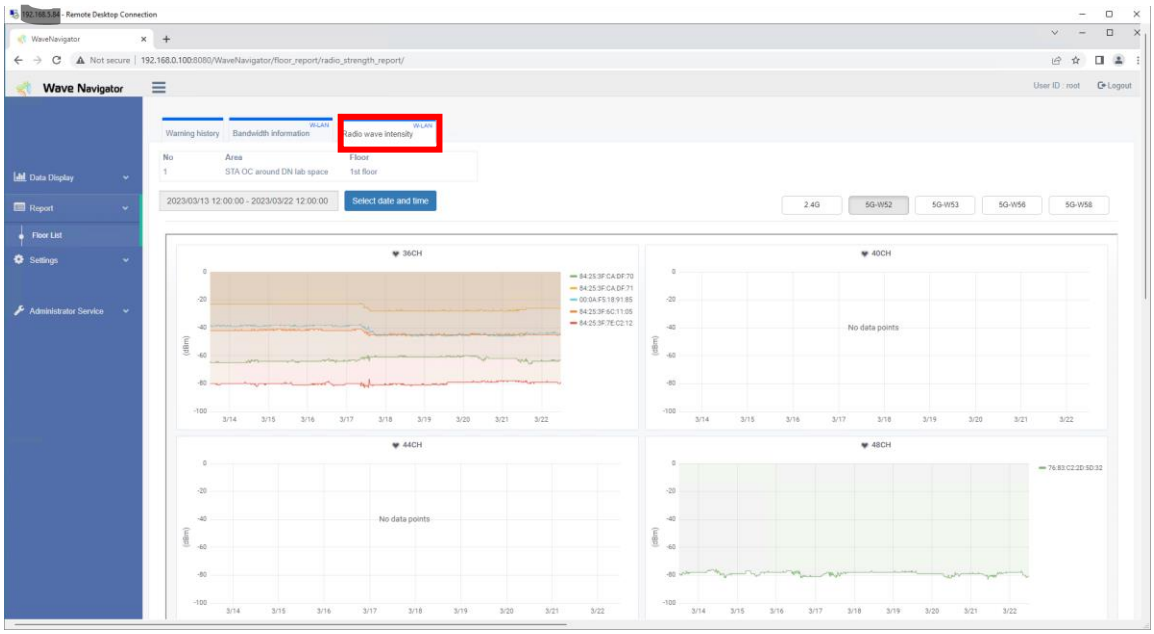
1. Bandwidth utilization
2. Error frame rate
3. Retry frame rate



A specific channel can be selected from the pull-down menu. The information helps check how the Wi-Fi environment on the floor changes over time. It can help troubleshoot occasional errors, adjust a WLAN environment such as installing additional access points for load balancing, channel adjustment, etc.

2.4.3 Radio wave intensity

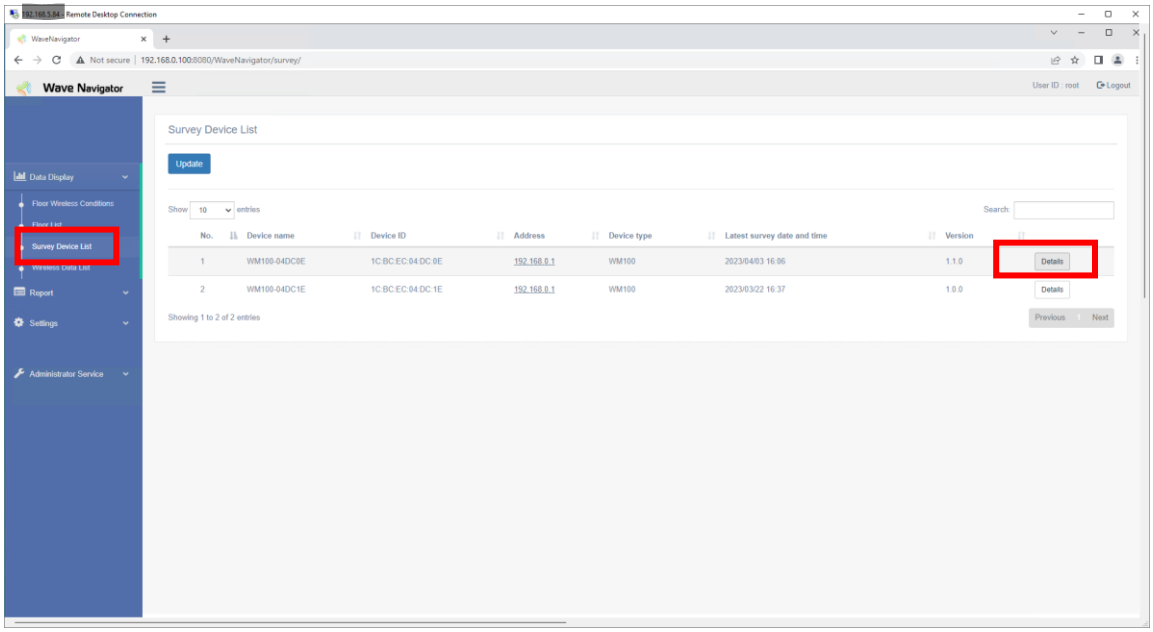
The “Radio wave intensity” tab shows the time chart of the signal strength of registered devices. The information helps check some unintentional situations, such as downtime of the registered access points or stations, decrease in the radio signal strength caused by a newly installed obstacle around the access point, move of a station device, etc.

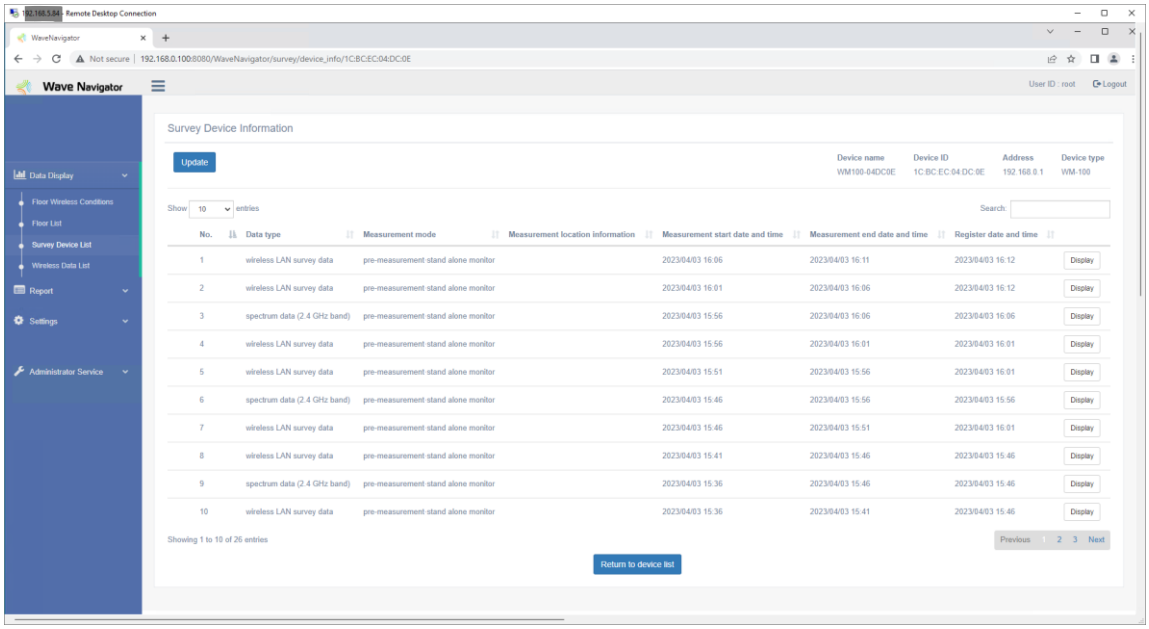


2.5 Record

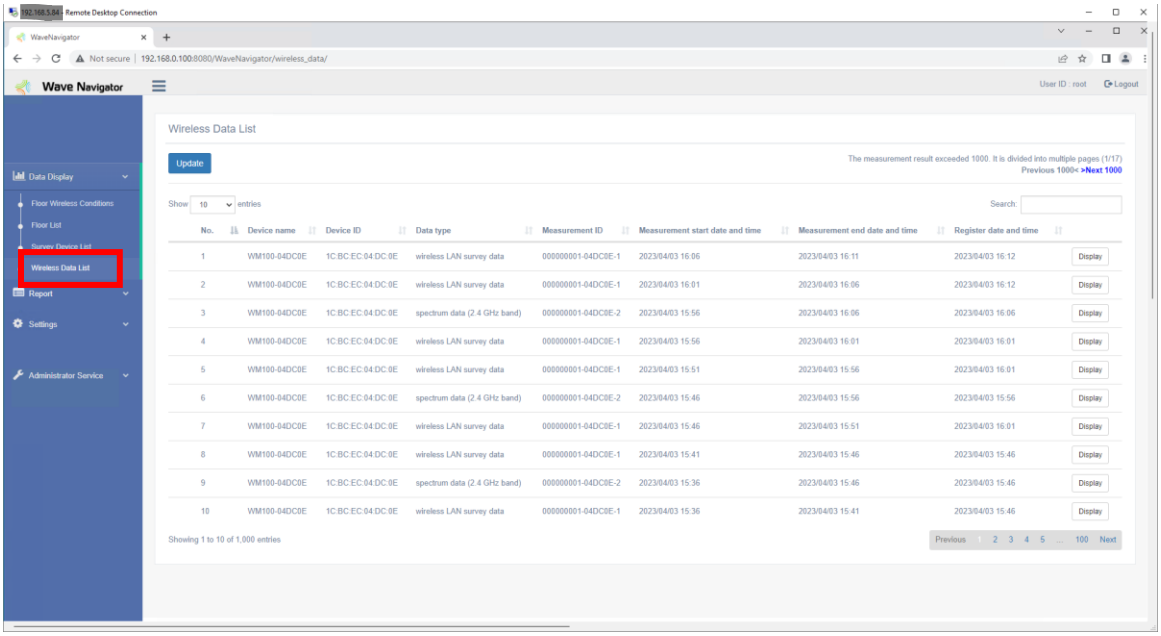
The list of recorded data can be found in two ways:

1. “Data Display” > “Survey Device List” > “Details”



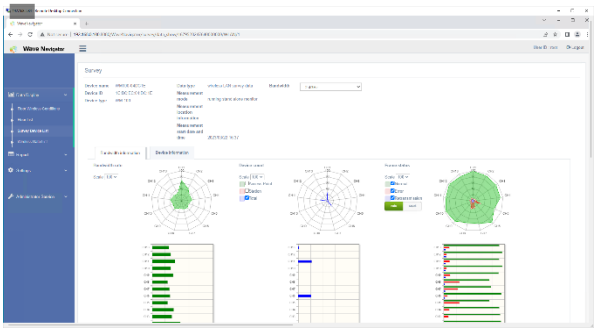


2. “Data Display” > “Wiireless Data List”



Once the data is found, click “Display”. The survey information will appear.

wireless LAN survey data

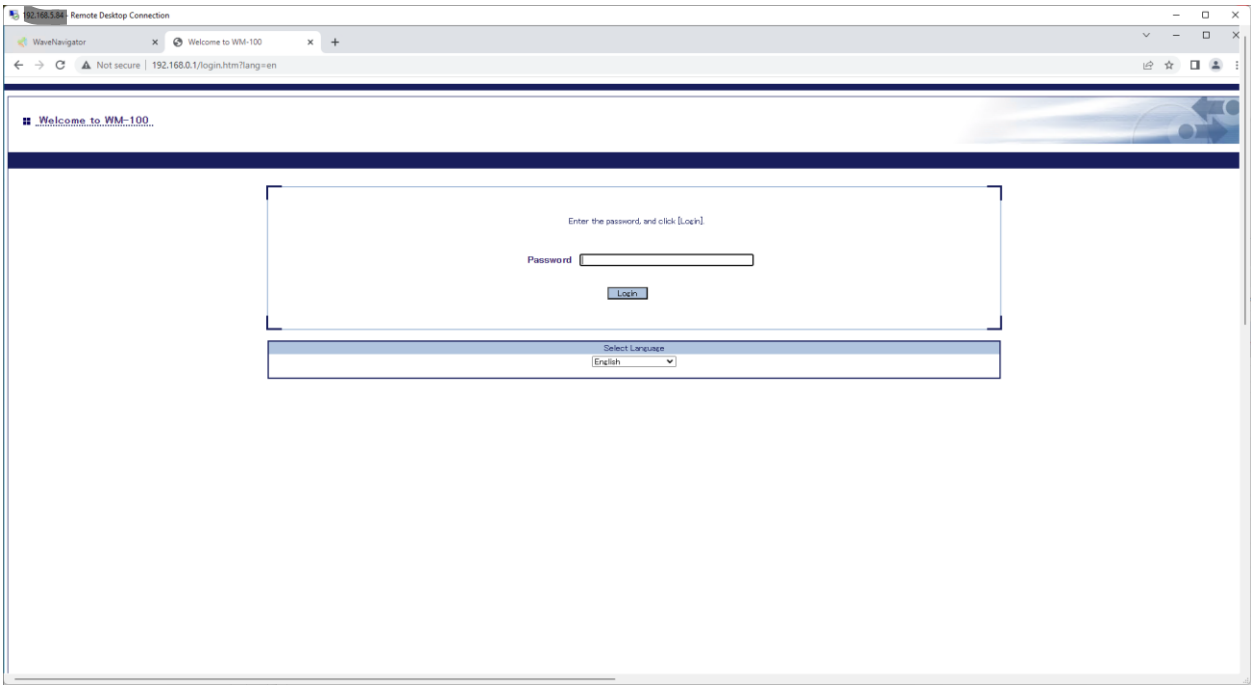


spectrum data

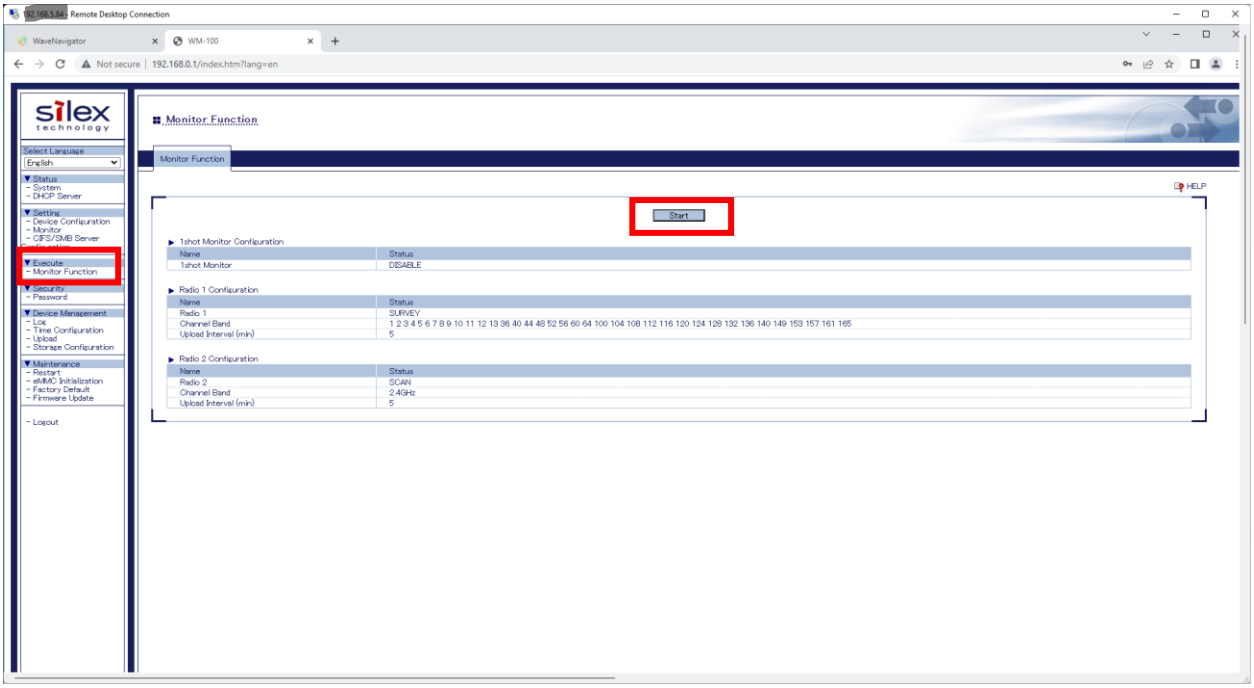
3. How to capture the wireless packet

3.1 Wireless packet capturing with the WM-100 and the Wave Navigator

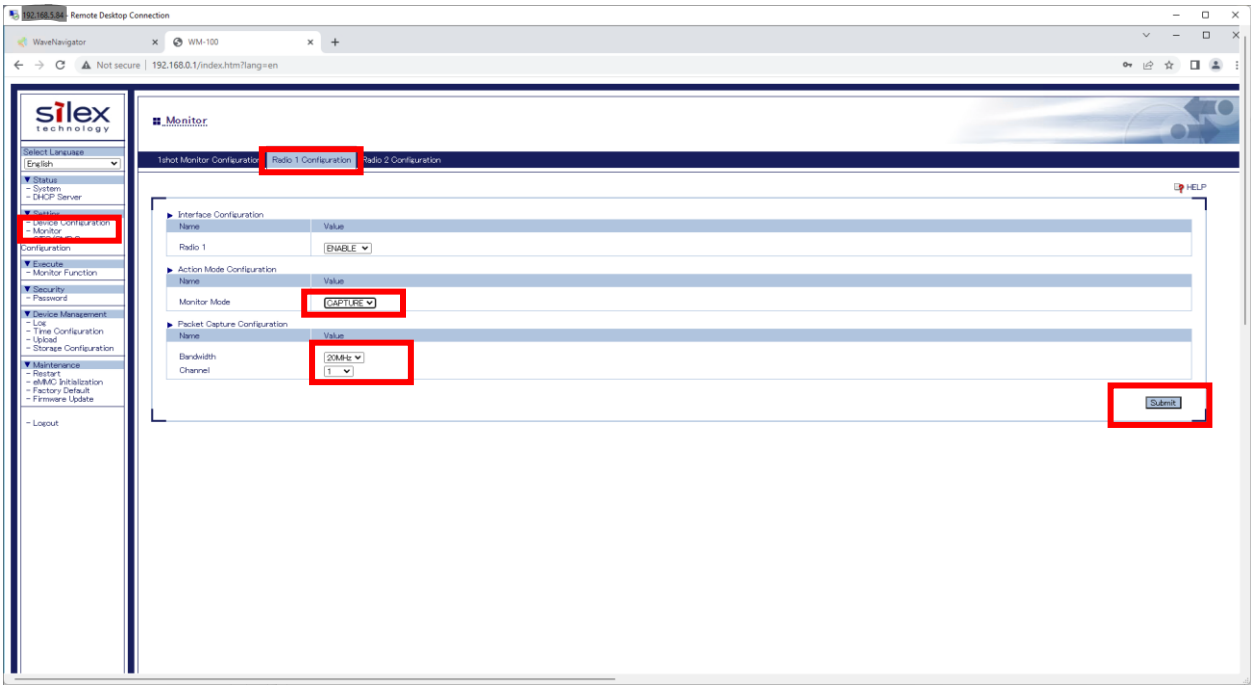
1. Ensure the monitoring is not running.



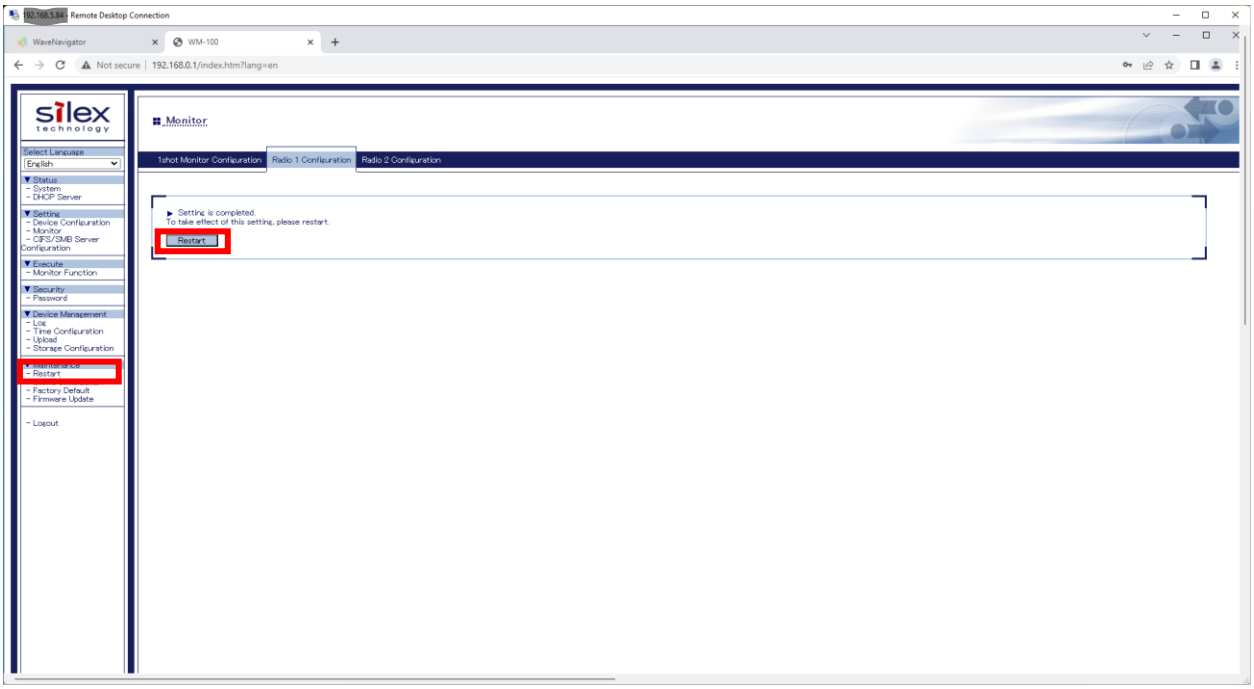
If the button shows “Stop”, please click it to stop monitoring.



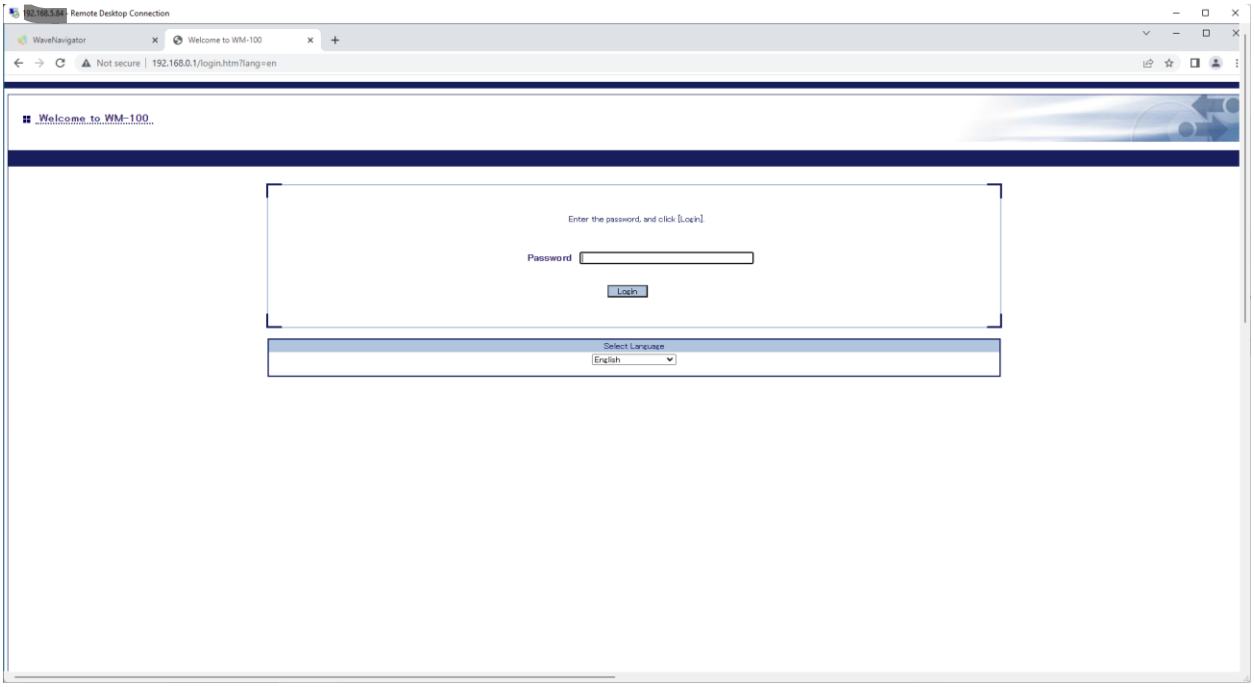
2. Set monitor mode to “CAPTURE”, select the bandwidth and the channel to capture wireless packets, and submit.



3. Restart the WM-100.

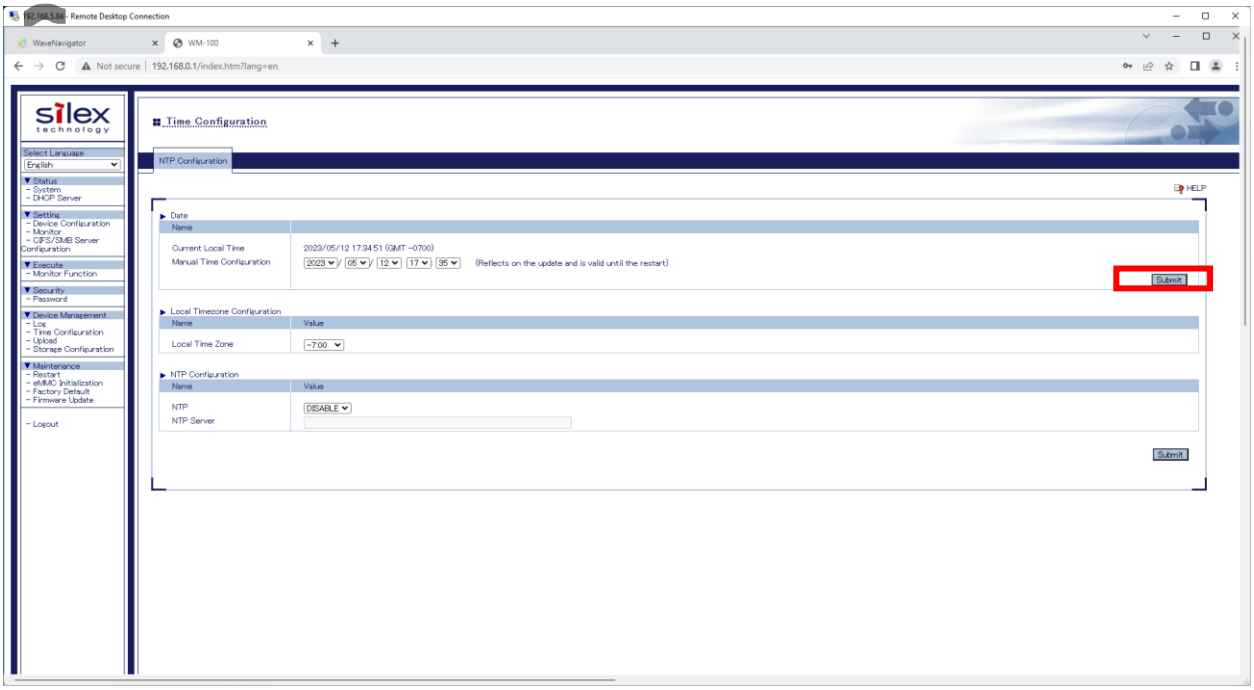


4. Start capturing the packet

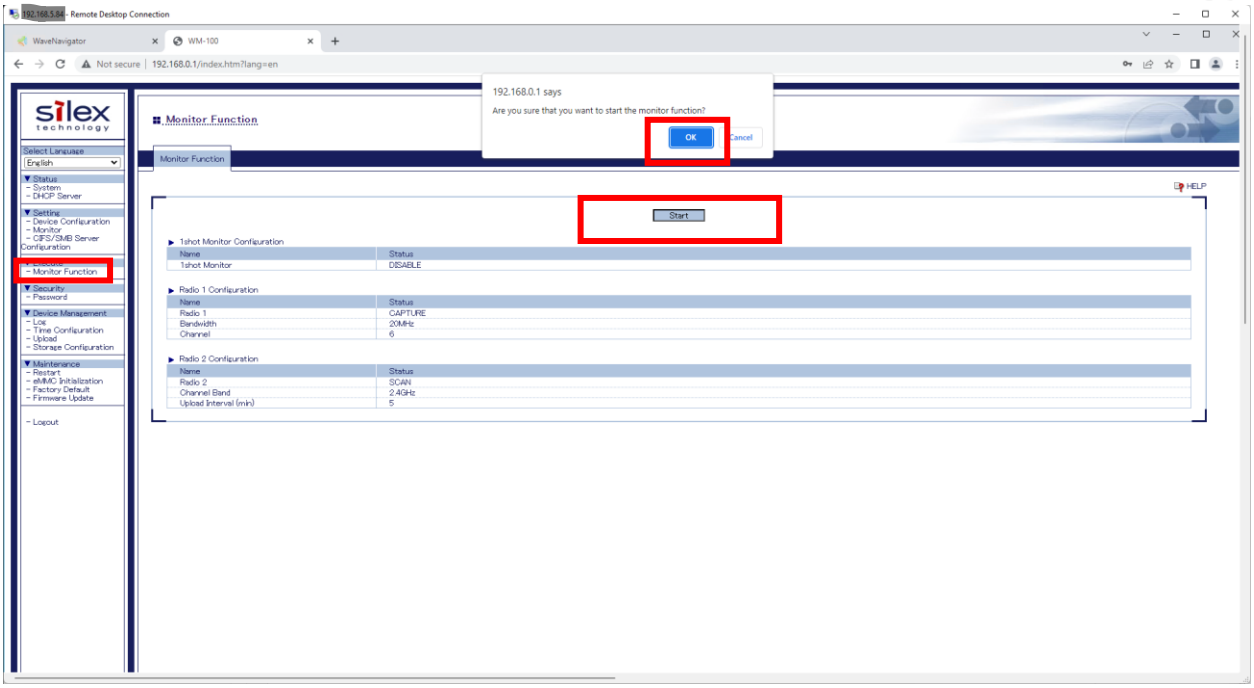


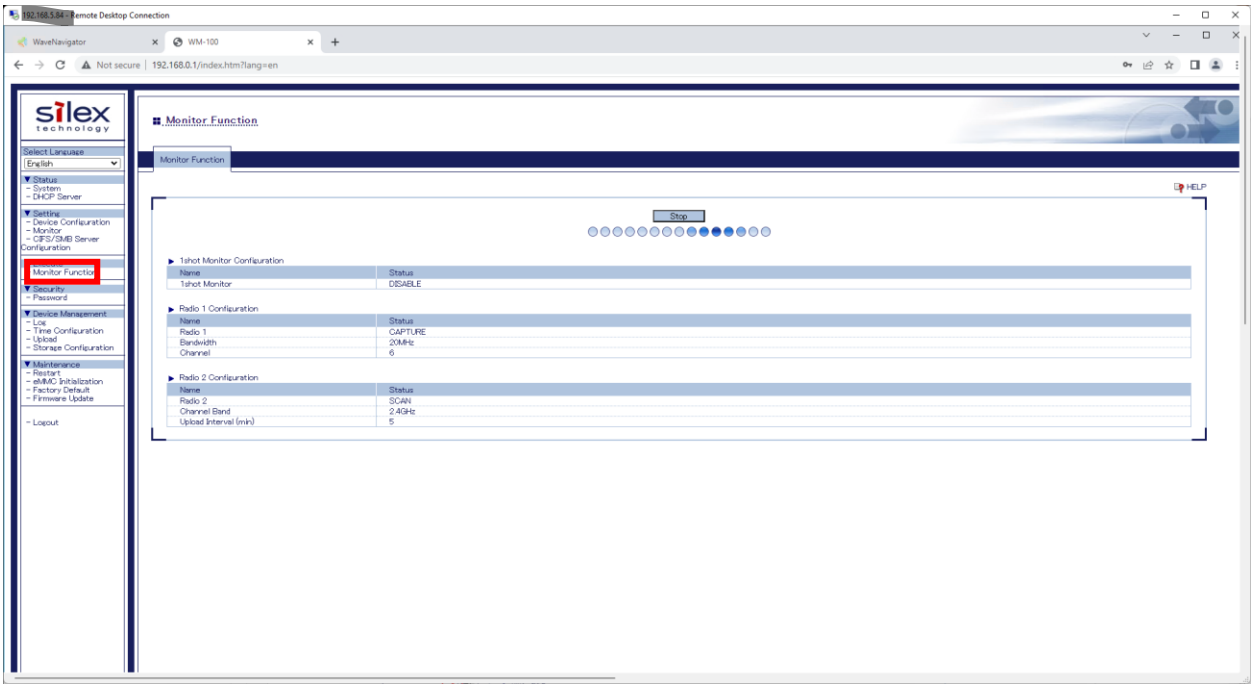
Set the time as necessary.

When the DIP switch #1 pin is “ON”, the WM-100 starts capturing the packets automatically. If the NTP is not configured, please stop the capturing, and set the time.

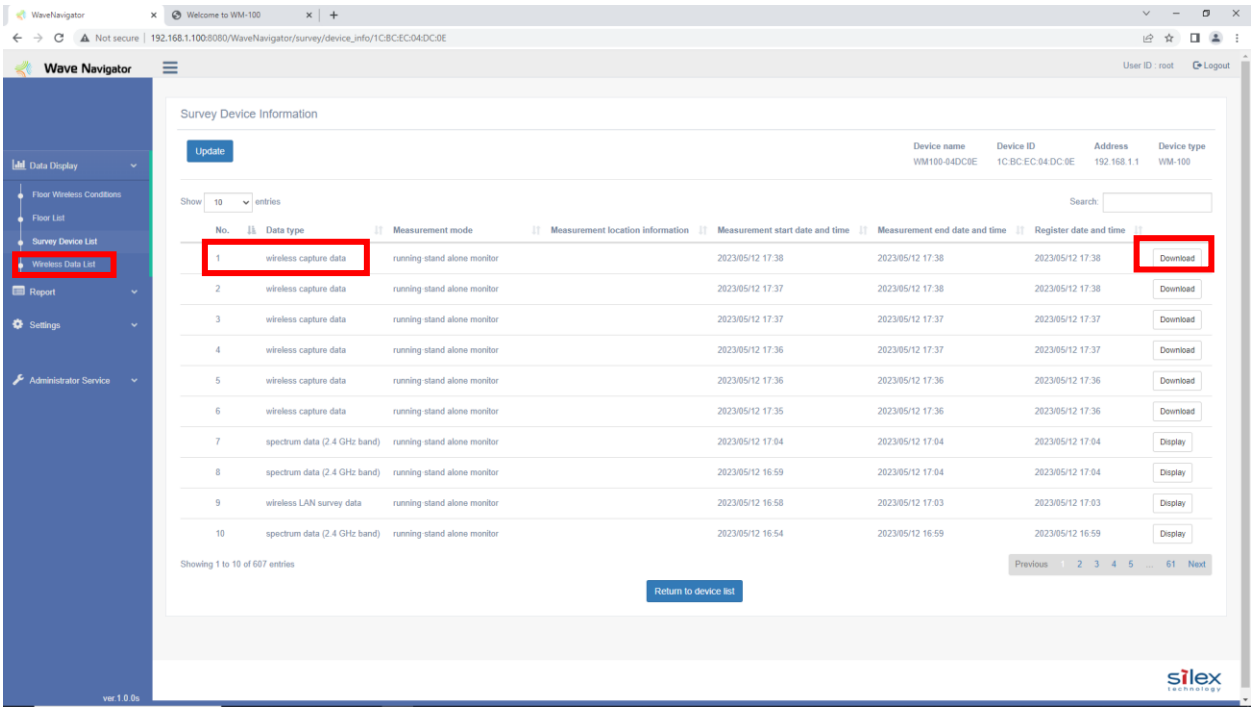


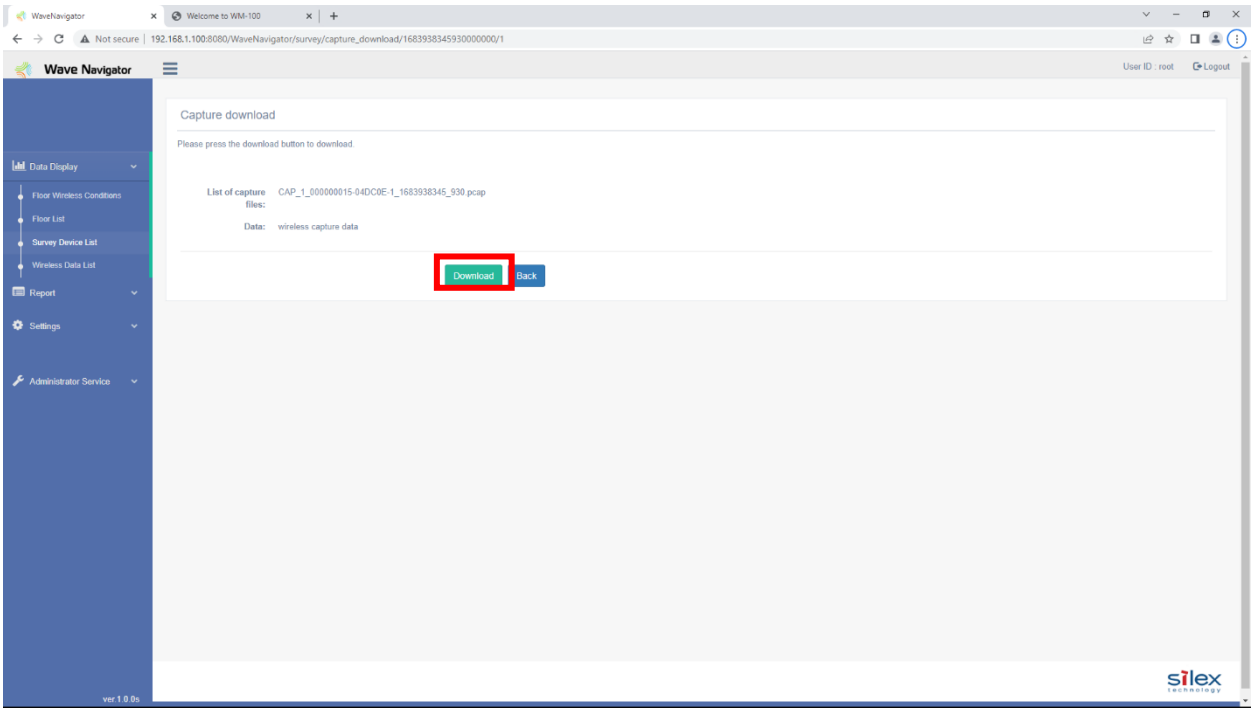
Click “Start” to start the capture from the web page.



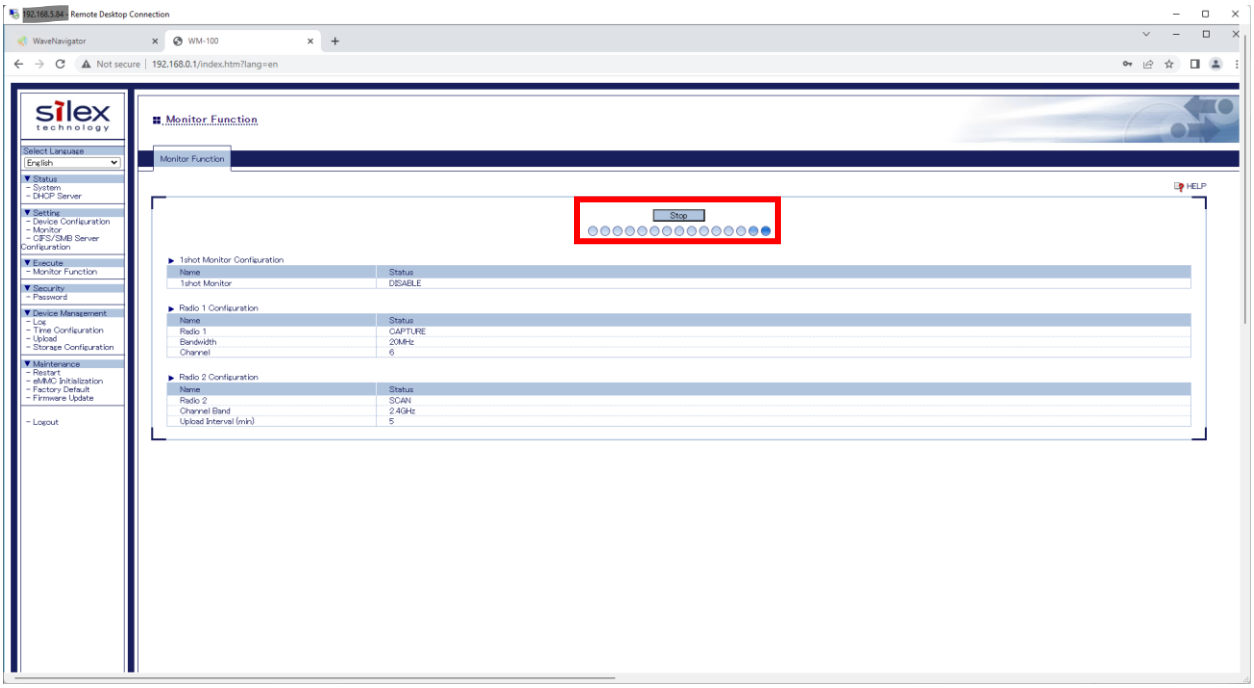


5. Check if the wireless capture data is uploaded to the Wave Navigator. Download the data if available.



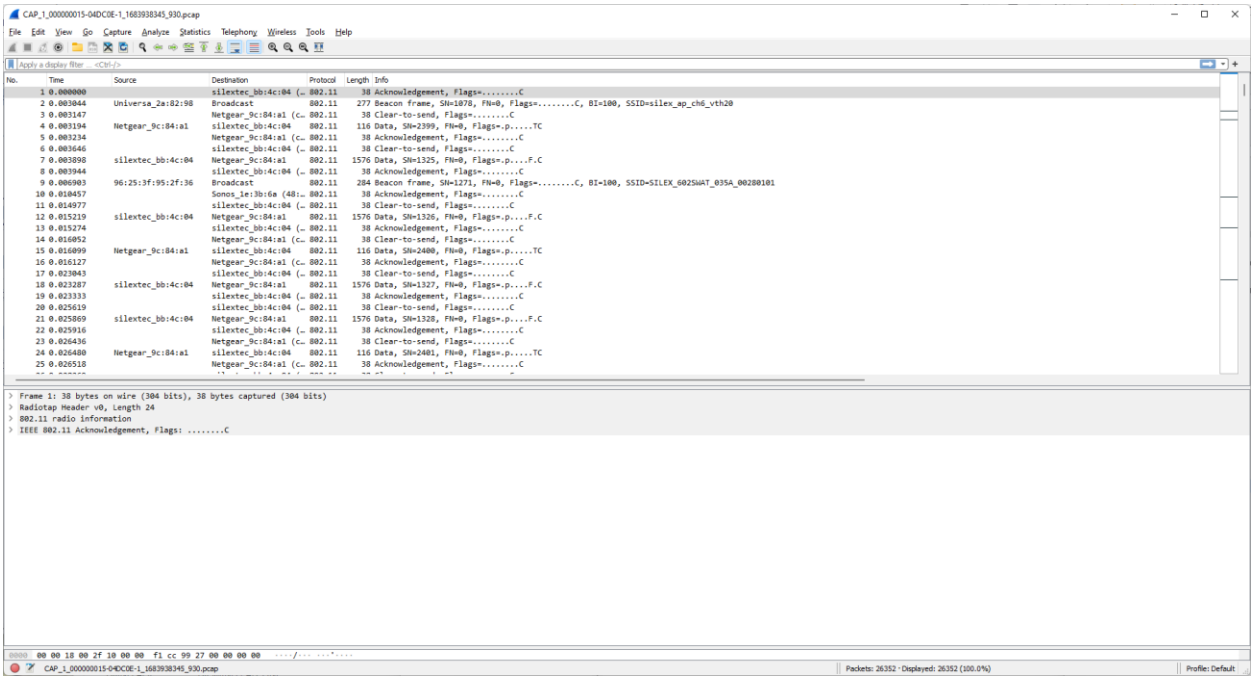


6. Stop capturing the wireless packet.



3.2 Open the captured file

The captured file's fomat is pcap file. A recommended software to open the file is Wireshark.



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