Using NetSupport School in a wireless Classroom

It is recognised that wireless networks generally do not perform as reliably as wired networks as they use radio frequencies to transmit data and these are susceptible to interference. In addition, simultaneously connecting a large number of devices to a wireless access point will have a negative impact on the bandwidth allocated to each.

When using NetSupport School in an un-optimised wireless environment, the above can result in poor performance and student devices frequently disconnecting from the Tutor console.

NetSupport School uses advanced techniques to limit the effects of an unreliable wireless network. However, when planning an installation of NetSupport School within a wireless environment, there are a number of factors that should be considered to ensure you experience the best performance:

- Choosing your wireless access point
- Different types of wireless networks
- Positioning your wireless access point
- Wireless channel congestion and overlapping
- Detecting wireless channel congestion or wireless overlapping
- Sources of wireless interference
- Optimising NetSupport School for use in a wireless environment

Choosing your wireless access point

One of the main considerations is to ensure that the wireless access point is designed to support the number of devices that you are planning to simultaneously connect to it. For this information, please refer to the manufacturer's guidelines.

Generally, a wireless access point designed for an enterprise/business environment will be required in a classroom environment where there are likely to be in excess of 10 simultaneously connected devices. Enterprise grade wireless access points do not automatically offer faster wireless performance, but by being better able to avoid interference from surrounding networks, they ensure the access point is able to operate at close to its capabilities.

Different types of wireless networks

Most wireless access points/wireless routers use the IEEE 802.11 set of standards. However, there are different IEEE 802.11 protocols available as follows:

IEEE 802.11 Protocol	Data rate (Maximum)	Supported frequency
802.11a	54 Mbps	5 GHz/3.7 GHz
802.11b	11 Mbps	2.4 GHz
802.11g	54 Mbps	2.4 GHz
802.11n	600 Mbps	2.4 GHz/5 GHz

Different wireless access points will include varying levels of support for the different IEEE 802.11 protocols. Depending on the protocol(s) supported by your wireless access point, you will find different levels of performance.

Positioning your Wireless Access Point

When choosing the location of the wireless access point within the classroom, we recommend the following:

- Locate the wireless access point in close proximity to the devices that will be connected

- Place the device on a high shelf or mount it close to or on the ceiling

- Ensure that the device is not situated near any metal objects, such as filing cabinets

- Ensure the wireless antenna is in a vertical position

- Ensure that you have conformed to the manufacturer's guidelines.

Wireless channel congestion and overlapping

Most wireless access points can be configured to broadcast on either 2.4 GHz or 5 GHz frequency bands. The 5 GHz frequency band is less congested – however, not all connecting devices are able to use this frequency (refer to the manufacturer's specification for further information).

For wireless access points using the 2.4 GHz frequency band, it is also possible to specify a channel ranging between 1 and 14.
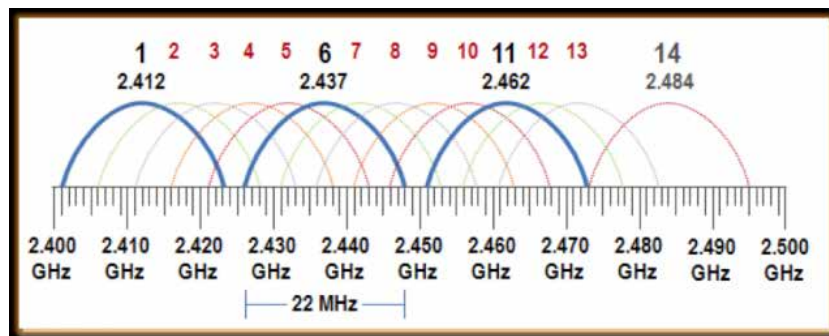
The diagram above depicts a spectrum analyser view of the frequency space occupied by these 14 channels. Within the 2.4 GHz band, only three channels have non-overlapping frequency space: channels 1, 6 and 11.

Please note: In the United States, only channels 1 to 11 can be used – and in Europe, the Middle East and Africa, only channels 1 to 13. For other countries, please refer to the manufacturer's guidelines or check with your local regulatory authority.

When deploying wireless access points, wherever possible you should ensure that there are no other access points in close proximity using the same or an overlapping channel. Details of how to detect other wireless networks can be found in the following section "Detecting wireless channel congestion or wireless overlapping". Please also read the section on "Sources of interference".

If you detect another wireless access point in close proximity using the same or an overlapping channel, performance on each wireless access point will be affected. We recommend that you use different non-overlapping channels wherever possible.

In order to change the wireless channel utilised by your wireless access point, please consult the manufacturer's instructions.

Detecting wireless channel congestion or wireless overlapping

Third-party Wi-Fi scanner tools such as inSSIDer are available to allow you check for nearby wireless networks and confirm the channels that they are using.

This type of tool will allow you to detect nearby wireless networks, confirm the different channels these are using and determine which wireless channels may be the least congested.

Using this information, you can then select the best wireless channel for your wireless access point to broadcast on.

Sources of interference

Wi-Fi uses publicly designated radio bands to provide wireless access. Non-Wi-Fi devices like mobile and cordless phones, Bluetooth transmitters and security cameras may use the same radio bands and can interfere with and cause performance issues for a wireless network. Wi-Fi scanning tools cannot detect such interference; therefore you will need to take this into consideration.

Optimising NetSupport School for use in a wireless environment

Once you have established a reliable wireless connection between the devices in your classroom, there are some settings within the Tutor console that you can change to optimise performance on your wireless network.

A school will have a finite amount of network bandwidth available; viewing the students' screens, distributing files or broadcasting the teacher's screen simultaneously will consume this bandwidth.

NetSupport School provides multiple configuration options designed to reduce the amount of data sent across the network – this will result in improved performance. These options can be found under their respective configuration sections in the Tutor console.

> For a wireless environment, it is recommended that both of the options within the Performance section of the Tutor settings are selected:
>
> **Colour reduction –** When broadcast, the view window, thumbnails and the teacher's screen will be restricted to 256 colours.
>
> **Low bandwidth mode –** The number of video frames transferred will be reduced to around 5 per second.
>
> These options can be found in the Tutor console. To configure them, select {School}{Configurations…} {Performance} and ensure that both options are selected.
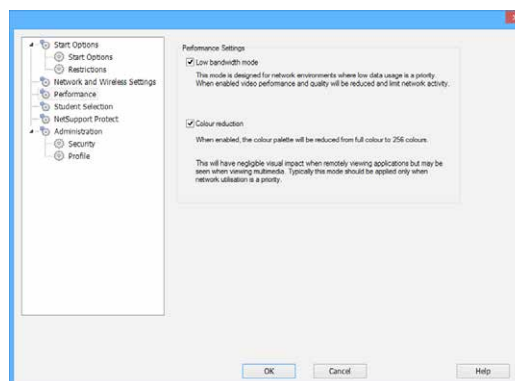
Additionally, within the Network and Wireless Settings section of the Tutor console, it is recommended that the following option is enabled when using NetSupport School on a wireless network:

Enable Broadcast Show – When broadcasting the teacher's screen or distributing files to multiple students, enabling this option will result in the screen data or files being sent to all machines simultaneously.

Finally, performance can further be enhanced by reducing the speed that the Tutor console sends data onto the network to match the speed that the wireless access point can deliver the data. Sending data onto the network too quickly may result in packets being lost, which will result in the students requesting the data again and additional traffic being produced on the network.

For a wireless environment, it is recommended that the following options are set:

Wireless Network – Select this option to optimise NetSupport School for best performance in a wireless environment.

Maximum Throughput – This option provides the ability to fine tune the speed that the Tutor console sends data to the connected student devices.

When configuring NetSupport School for use in a wireless classroom, consideration should be given to the number of student computers that will be connected to the access point at any one time. Due to the nature of wireless networking, only one device at a time can send and receive data through the access point, so performance will reduce as the number of students increases.

For a typical class of 30 students, we recommend starting with the default Maximum Throughput value of 8 Mbps. However, depending on the actual performance of your wireless network and whether the teacher's device is connected to the network using a cable (which will result in better performance), this value could be increased to match the faster network speed - or decreased accordingly until the optimal settings are found.

IEEE 802.11 Protocol	Data rate (Maximum)	Suggested Maximum Throughput value
802.11a	54 Mbps	8 Mbps
802.11b	11 Mbps	6 Mbps
802.11g	54 Mbps	8 Mbps
802.11n	600 Mbps	12 Mbps

These options can be found in the Tutor console. To configure them select {School}{Configurations…} {Performance}, ensuring that the applicable options are selected.
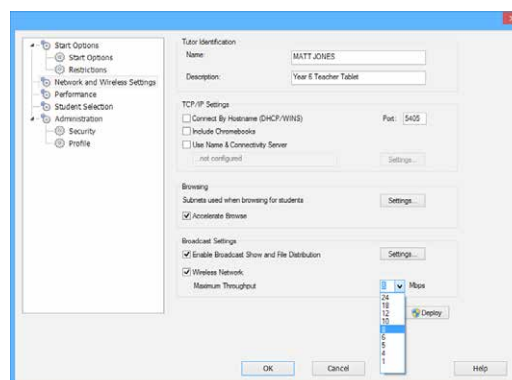
For additional information, please contact NetSupport's Technical Support team at
support@netsupportsoftware.com