

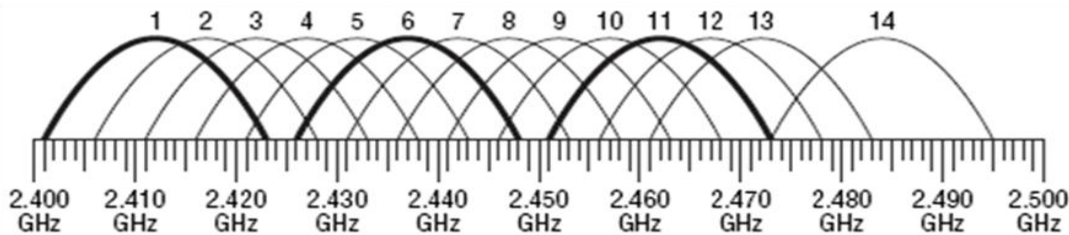
Wireless Redundancy

Eliminating single points of failure when implementing local area networks in enterprise and industrial environments has become increasingly common when designing them. Single points of failure are detrimental to any network that has a requirement to be highly available and can cause system-wide outages upon failure. As wireless local area networks (WLAN's) overcome previous limitations and become an increasingly popular method of communication as an alternative and/or extension of wired networks, the challenge of implementing a redundant WLAN increases. Using N-Tron 702-W wireless equipment, redundancy can be achieved in several different ways, which will be discussed in this paper.

When designing and implementing a redundant wireless network, it is important to keep in mind the IEEE 802.11 channelization scheme. In the 2 GHz frequency range (802.11b/g), there are 11 channels in the United States and 14 Worldwide (See Table 1). Only three of these are non-overlapping channels (See Figure 1). It is recommended that no more than 15-20% of the channels overlap because it can lead to excessive roaming. On the other hand, proper cell overlap while avoiding over-deployment can help prevent roaming issues.

Channel	Freq (GHz)	Channel	Freq (GHz)
1	2.412	7	2.442
2	2.417	8	2.447
3	2.422	9	2.452
4	2.427	10	2.457
5	2.432	11	2.462
6	2.437		

Table 1



•All the channels overlap except for three.

Figure 1

If more non-overlapping channels are needed, the 5 GHz frequency offers 12 non-overlapping channels, each with 20MHz of bandwidth (See Table 2). In order to design a wireless network with coverage redundancy, one must develop a scheme in which non-overlapping channels are used in order to avoid too much interference but enough coverage to provide for redundancy, if one AP were to fail (See Figure 2).

Channel	Freq (GHz)
UNII - 1	36, 40, 44, 48
UNII - 2	52, 56, 60, 64
UNII - 3	149, 153, 157, 161

Table 2

WLAN redundancy can be defined as the excess number of AP's deployed by WLAN administrators to sustain heavy load or to compensate for equipment failure. To achieve this, AP's are placed close to each other to provide overlapping coverage to users in their proximity. Another option in providing redundant wireless coverage is to implement both the 2.4GHz and 5GHz frequencies when deploying wireless. In order to do this, two 702-W's must be installed at each location, in order to transmit on both frequencies at the same time. Vendors have begun offering dual-band radio network interface cards (NIC's), which reduces interoperability problems and increases the WLAN offering. A client equipped with a dual-band radio NIC can associate with either a 2.4GHz (802.11b/g/n) or 5GHz (802.11a/n) access point; therefore, it's a great way to achieve redundancy.

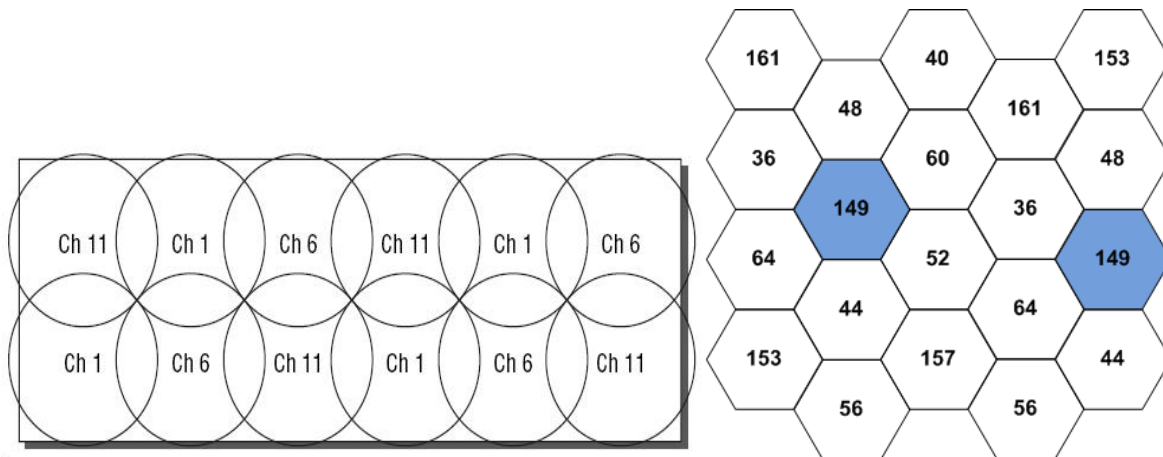


Figure 2

Configuring multiple AP's connected to the same backbone network with a standard SSID, but operating on different non-overlapping channels is another way to achieve wireless redundancy. In the event of an Access point failure, the client's roaming algorithm will pick up another close by radio. If multiple roaming stations exist, enabling WDS would be recommended (see WDS Whitepaper for more information). If redundancy is needed for an access point or wireless link, Redundant Wireless Access Point configurations are easy to implement using the Wired Extended Service Set. The station is set to connect automatically to multiple APs all with the same SSID but on different channels and will connect to the one with the strongest signal. In the event of a loss of the AP to which it is connected, the station will switch to another AP (See Figure 3).

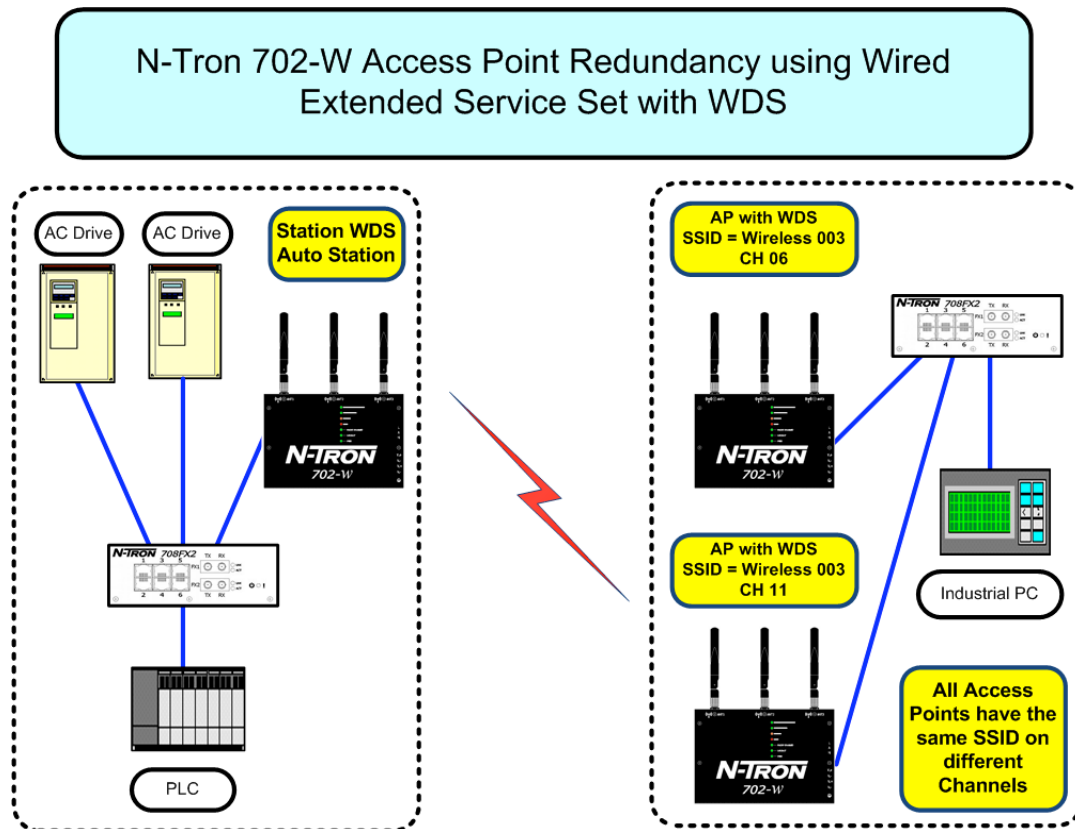


Figure 3

Fully Redundant Wireless networks can be configured by using two or more stations connected to a switch with RSTP protocol running to prevent ring or loop formation (See Figure 7). These stations should all be programmed to automatically connect to same SSID. Access Points, with the same SSID but on different channels, will then be connected to a switch to complete the redundant connection. This network configuration will insure that a loss of any single station or access point will not result in the loss of communication between the two connected areas.

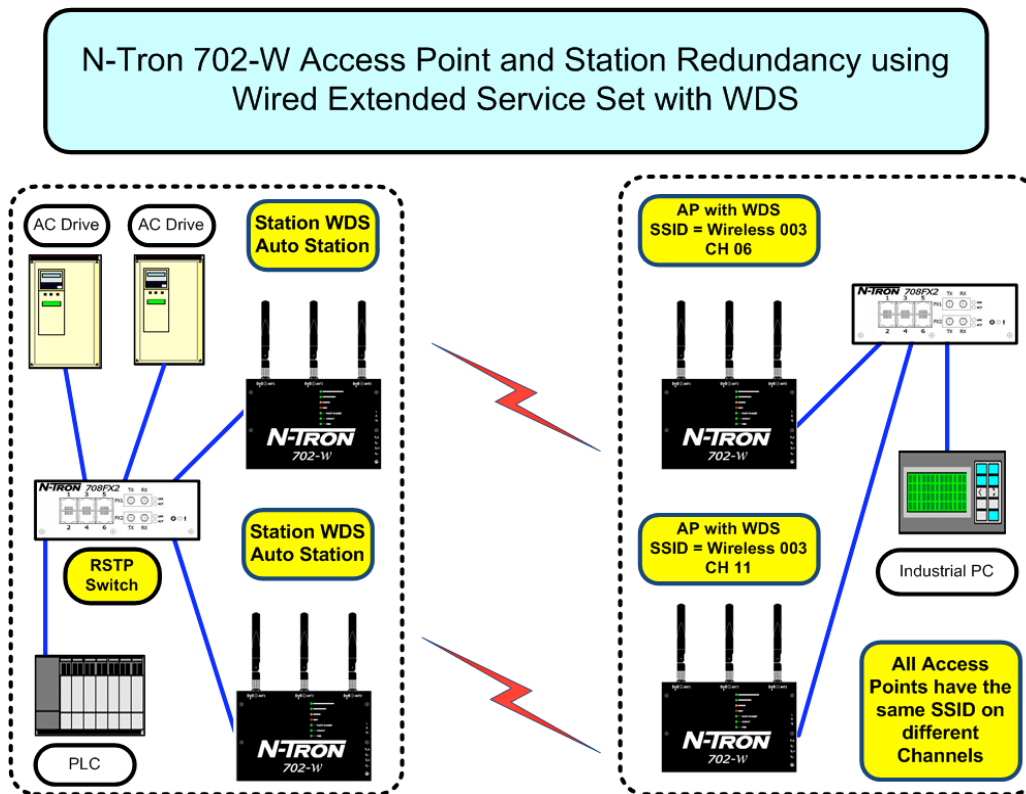


Figure 4

Redundant wireless networks ensure that client's remain in service and critical network links continue to pass data. The best way to avoid long wireless issues and outages is through redundancy, which allows access points, stations, and clients to accociate to a secondary connection when failure of the primary link occurs. In some cases (dependant on the design and implementation), the redundant wireless coverage is able to almost or fully replace the primary coverage, in terms of speed and bandwidth so as to minimize the business impact.