



Est. USA 1981

www.AKCP.com

SP+ Network Access Control Manual

Introduction

The Network Access Control (NAC) is a new feature for SP+ F7 and H7 units, starting with firmware 5605.

It is an *incoming* packet filter (network firewall) which supports low-level filtering of all IPv4 and IPv6 traffic.

Turning on the NAC feature affects all *incoming* open ports and all network interfaces on the unit (Ethernet and modem). The *outgoing* network traffic is not affected.

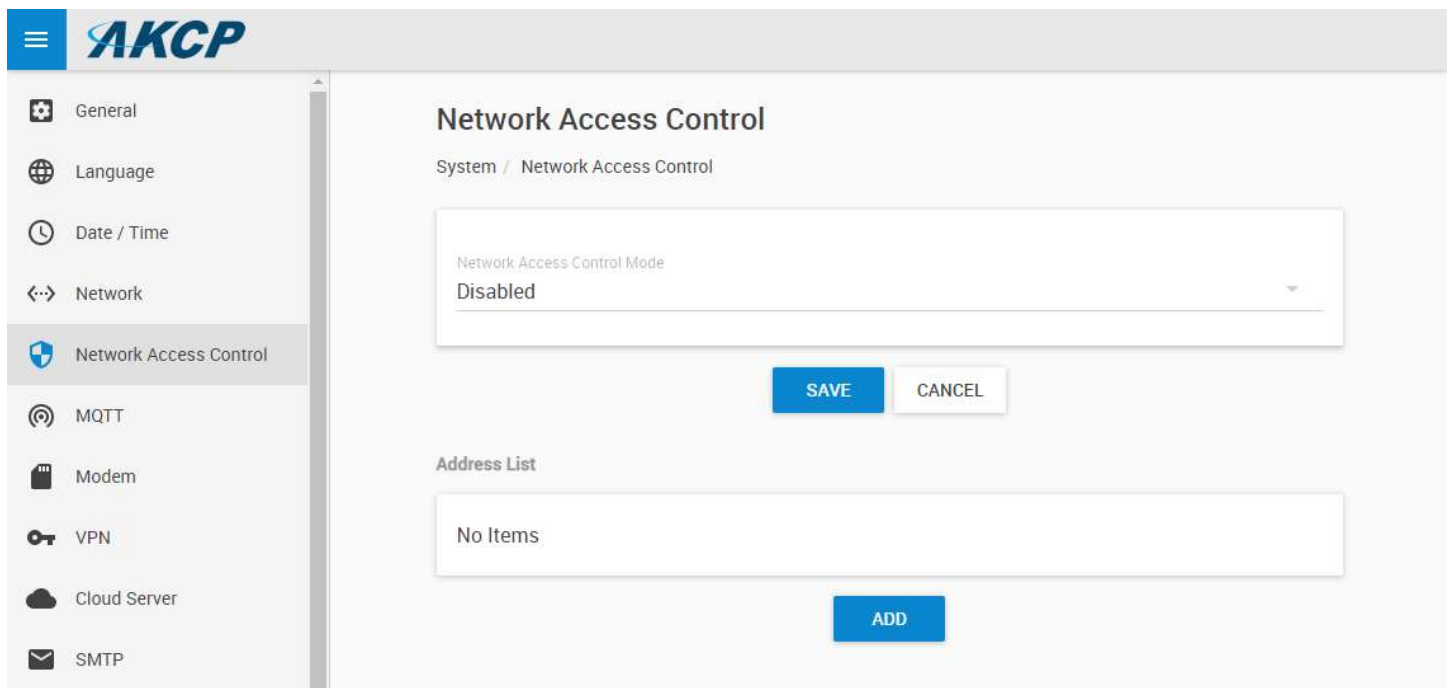
NAC has two modes: whitelist or blacklist.

In **blacklist** mode, you can block certain IP addresses or address ranges from accessing the unit in any way.

In **whitelist** mode, ONLY the allowed IP addresses can connect to the unit, and any other IPs will be blocked. Therefore, this mode must be used carefully to prevent locking out yourself.

Configuration

Go to Settings menu -> Network Access Control



The screenshot displays the AKCP web interface for Network Access Control configuration. On the left is a sidebar menu with options: General, Language, Date / Time, Network, Network Access Control (selected), MQTT, Modem, VPN, Cloud Server, and SMTP. The main panel is titled 'Network Access Control' and shows the breadcrumb 'System / Network Access Control'. A dropdown menu for 'Network Access Control Mode' is currently set to 'Disabled'. Below the dropdown are 'SAVE' and 'CANCEL' buttons. Further down is an 'Address List' section containing the text 'No Items' and an 'ADD' button.

The default NAC mode is disabled (no filtering); this mode is the same as on earlier firmware.

Blacklist mode

Network Access Control

System / Network Access Control

Network Access Control Mode

Black List

SAVE CANCEL

Address List

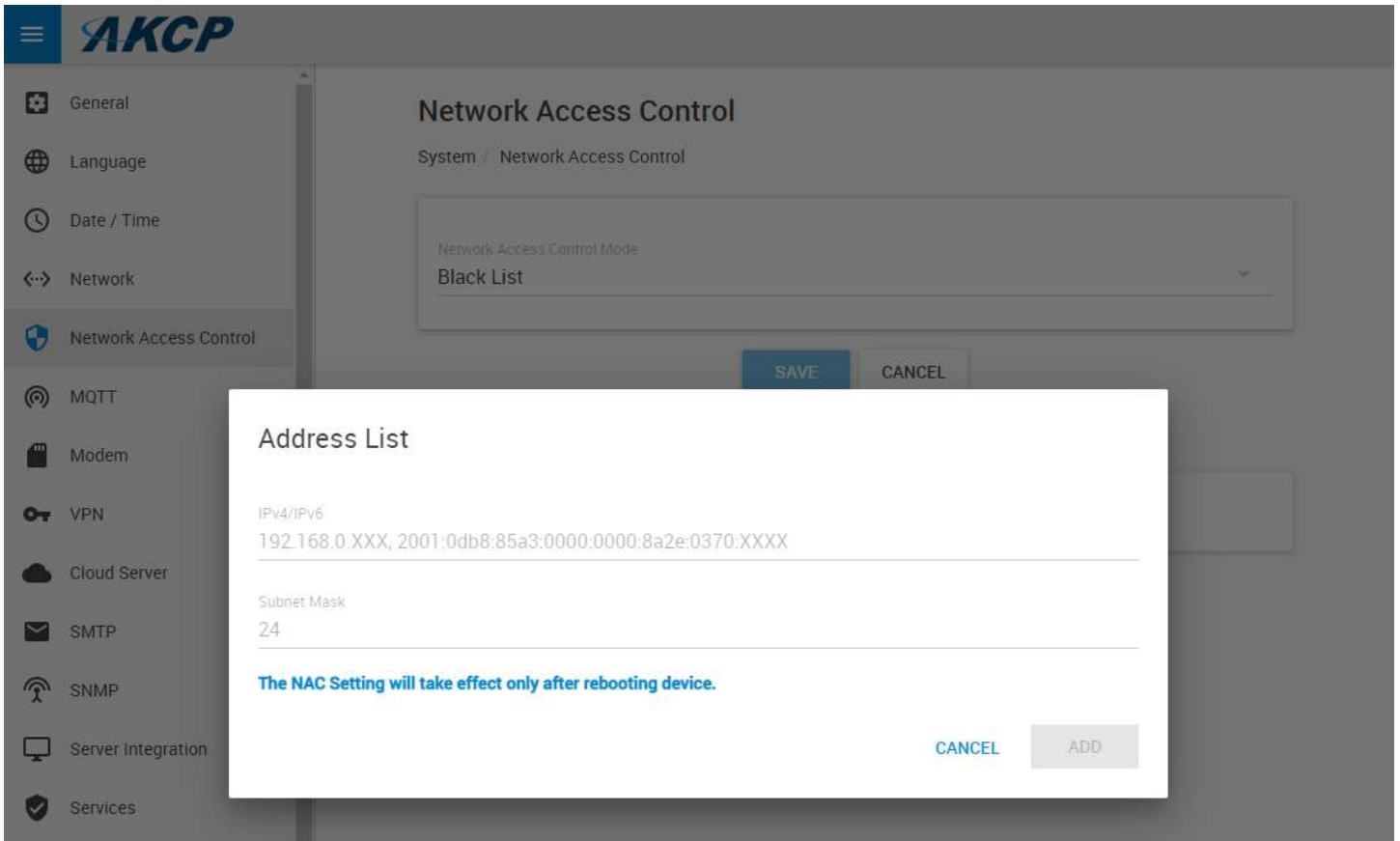
| | |
|------------------|--|
| 192.168.1.137/32 | |
| 192.168.0.1/24 | |
| 172.16.1.1/16 | |
| fd00::1/128 | |

ADD

As noted above, in blacklist mode, the unit will block access from certain IP addresses or address ranges from accessing the unit in any way.

Click on the **Add** button and add your IP address(es) or address range(s) one by one.

Important: You can only define a maximum of 10 entries!



Note that you must always specify the subnet mask for even a single IP address.

Examples:

Block a single IPv4 host (subnet mask 32):

192.168.1.137/32

Block a single IPv6 host (subnet mask 128):

fd00::1/128

Block all IPv4 addresses from 192.168.0.x network (subnet mask 24):

192.168.0.1/24

Block all IPv4 addresses from 172.16.x.x network (subnet mask 16):

172.16.1.1/16

When you have added all IP addresses or network ranges that you want to block, click on the **Save** button and **reboot** the unit to make the changes effective.

Whitelist mode

Network Access Control






System / Network Access Control

Network Access Control Mode

White List

SAVE CANCEL

Address List

| | |
|------------------|---|
| 192.168.1.137/32 |  |
| 192.168.0.1/24 |  |
| 172.16.1.1/16 |  |
| fd00::1/128 |  |
| 192.168.1.1/24 |  |

ADD

As noted above, in whitelist mode ONLY the allowed IP addresses can connect to the unit, and any other IPs will be blocked. Therefore, this mode must be used carefully to prevent locking out yourself.

The configuration is exactly the same as for the blacklist mode (see above).

When you have added all IP addresses or network ranges that you want to allow, click on the **Save** button and **reboot** the unit to make the changes effective.

Reset button function for NAC

In case you misconfigure NAC feature and you can no longer access the unit, the Reset button can be used to disable NAC.

Note that doing so will also reset the passwords for the built-in WebUI user accounts (User, Viewer, Admin) if you have set a custom password for them.

To disable NAC and reset WebUI passwords to default, press and hold Reset button for 7-12 seconds.

After using the Reset button function as above, the device has to be rebooted to make the changes effective (power cycle).

Then you can access the unit's WebUI and reconfigure NAC feature.

Note that you will have to re-enter the WebUI passwords for the built-in users again, if you have customized them.

Network subnet ranges

If you need additional help in correctly defining the network subnet mask for the IP addresses, we recommend using the following links:

<https://www.calculator.net/ip-subnet-calculator.html>

https://packetlife.net/media/library/15/IPv4_Subnetting.pdf

https://www.ripe.net/about-us/press-centre/ipv6-chart_2015.pdf

<https://www.crucial.com.au/blog/2011/04/15/ipv6-subnet-cheat-sheet-and-ipv6-cheat-sheet-reference/>

Quick reference can be found below for IPv4 and IPv6 subnets.

IPv4 subnet ranges

| Subnets | | | | Decimal to Binary | | | |
|---------|-----------------|-----------|-----------|-------------------|-----------|----------|-----------|
| CIDR | Subnet Mask | Addresses | Wildcard | Subnet Mask | | Wildcard | |
| /32 | 255.255.255.255 | 1 | 0.0.0.0 | 255 | 1111 1111 | 0 | 0000 0000 |
| /31 | 255.255.255.254 | 2 | 0.0.0.1 | 254 | 1111 1110 | 1 | 0000 0001 |
| /30 | 255.255.255.252 | 4 | 0.0.0.3 | 252 | 1111 1100 | 3 | 0000 0011 |
| /29 | 255.255.255.248 | 8 | 0.0.0.7 | 248 | 1111 1000 | 7 | 0000 0111 |
| /28 | 255.255.255.240 | 16 | 0.0.0.15 | 240 | 1111 0000 | 15 | 0000 1111 |
| /27 | 255.255.255.224 | 32 | 0.0.0.31 | 224 | 1110 0000 | 31 | 0001 1111 |
| /26 | 255.255.255.192 | 64 | 0.0.0.63 | 192 | 1100 0000 | 63 | 0011 1111 |
| /25 | 255.255.255.128 | 128 | 0.0.0.127 | 128 | 1000 0000 | 127 | 0111 1111 |
| /24 | 255.255.255.0 | 256 | 0.0.0.255 | 0 | 0000 0000 | 255 | 1111 1111 |

| Subnet Proportion | |
|-------------------|--------|
| /25 | ~50% |
| /26 | ~12.5% |
| /27 | ~3.1% |
| /28 | ~0.8% |
| /29 | ~0.2% |
| /30 | ~0.1% |
| /30 | ~0.1% |

| Classful Ranges | |
|-----------------|-----------------------------|
| A | 0.0.0.0 - 127.255.255.255 |
| B | 128.0.0.0 - 191.255.255.255 |
| C | 192.0.0.0 - 223.255.255.255 |
| D | 224.0.0.0 - 239.255.255.255 |
| E | 240.0.0.0 - 255.255.255.255 |

| Reserved Ranges | |
|------------------|-------------------------------|
| RFC 1918 | 10.0.0.0 - 10.255.255.255 |
| Localhost | 127.0.0.0 - 127.255.255.255 |
| RFC 1918 | 172.16.0.0 - 172.31.255.255 |
| RFC 1918 | 192.168.0.0 - 192.168.255.255 |

Source: https://packetlife.net/media/library/15/IPv4_Subnetting.pdf

IPv6 subnet ranges

| IPv6 CIDR Subnet | Number of IPs |
|------------------|----------------|
| /128 | 1 |
| /127 | 2 |
| /126 | 4 |
| /125 | 8 |
| /124 | 16 |
| /123 | 32 |
| /122 | 64 |
| /121 | 128 |
| /120 | 256 |
| /119 | 512 |
| /118 | 1,024 |
| /117 | 2,048 |
| /116 | 4,096 |
| /115 | 8,192 |
| /114 | 16,384 |
| /113 | 32,768 |
| /112 | 65,536 |
| /111 | 131,072 |
| /110 | 262,144 |
| /109 | 524,288 |
| /108 | 1,048,576 |
| /107 | 2,097,152 |
| /106 | 4,194,304 |
| /105 | 8,388,608 |
| /104 | 16,777,216 |
| /103 | 33,554,432 |
| /102 | 67,108,864 |
| /101 | 134,217,728 |
| /100 | 268,435,456 |
| /99 | 536,870,912 |
| /98 | 1,073,741,824 |
| /97 | 2,147,483,648 |
| /96 | 4,294,967,296 |
| /95 | 8,589,934,592 |
| /94 | 17,179,869,184 |
| /93 | 34,359,738,368 |
| /92 | 68,719,476,736 |



| | |
|-------------------|---------------------------------|
| /91 | 137,438,953,472 |
| /90 | 274,877,906,944 |
| /89 | 549,755,813,888 |
| /88 | 1,099,511,627,776 |
| /87 | 2,199,023,255,552 |
| /86 | 4,398,046,511,104 |
| /85 | 8,796,093,022,208 |
| /84 | 17,592,186,044,416 |
| /83 | 35,184,372,088,832 |
| /82 | 70,368,744,177,664 |
| /81 | 140,737,488,355,328 |
| /80 | 281,474,976,710,656 |
| /79 | 562,949,953,421,312 |
| /78 | 1,125,899,906,842,624 |
| /77 | 2,251,799,813,685,248 |
| /76 | 4,503,599,627,370,496 |
| /75 | 9,007,199,254,740,992 |
| /74 | 18,014,398,509,481,985 |
| /73 | 36,028,797,018,963,968 |
| /72 | 72,057,594,037,927,936 |
| /71 | 144,115,188,075,855,872 |
| /70 | 288,230,376,151,711,744 |
| /69 | 576,460,752,303,423,488 |
| /68 | 1,152,921,504,606,846,976 |
| /67 | 2,305,843,009,213,693,952 |
| /66 | 4,611,686,018,427,387,904 |
| /65 | 9,223,372,036,854,775,808 |
| Residential - /64 | 18,446,744,073,709,551,616 |
| /63 | 36,893,488,147,419,103,232 |
| /62 | 73,786,976,294,838,206,464 |
| /61 | 147,573,952,589,676,412,928 |
| /60 | 295,147,905,179,352,825,856 |
| /59 | 590,295,810,358,705,651,712 |
| /58 | 1,180,591,620,717,411,303,424 |
| /57 | 2,361,183,241,434,822,606,848 |
| /56 | 4,722,366,482,869,645,213,696 |
| /55 | 9,444,732,965,739,290,427,392 |
| /54 | 18,889,465,931,478,580,854,784 |
| /53 | 37,778,931,862,957,161,709,568 |
| /52 | 75,557,863,725,914,323,419,136 |
| /51 | 151,115,727,451,828,646,838,272 |

| | |
|----------------|---|
| /50 | 302,231,454,903,657,293,676,544 |
| /49 | 604,462,909,807,314,587,353,088 |
| Business - /48 | 1,208,925,819,614,629,174,706,176 |
| /47 | 2,417,851,639,229,258,349,412,352 |
| /46 | 4,835,703,278,458,516,698,824,704 |
| /45 | 9,671,406,556,917,033,397,649,408 |
| /44 | 19,342,813,113,834,066,795,298,816 |
| /43 | 38,685,626,227,668,133,590,597,632 |
| /42 | 77,371,252,455,336,267,181,195,264 |
| /41 | 154,742,504,910,672,534,362,390,528 |
| /40 | 309,485,009,821,345,068,724,781,056 |
| /39 | 618,970,019,642,690,137,449,562,112 |
| /38 | 1,237,940,039,285,380,274,899,124,224 |
| /37 | 2,475,880,078,570,760,549,798,248,448 |
| /36 | 4,951,760,157,141,521,099,596,496,896 |
| /35 | 9,903,520,314,283,042,199,192,993,792 |
| /34 | 19,807,040,628,566,084,398,385,987,584 |
| /33 | 39,614,081,257,132,168,796,771,975,168 |
| ISP - /32 | 79,228,162,514,264,337,593,543,950,336 |
| /31 | 158,456,325,028,528,675,187,087,900,672 |
| /30 | 316,912,650,057,057,350,374,175,801,344 |
| /29 | 633,825,300,114,114,700,748,351,602,688 |
| /28 | 1,267,650,600,228,229,401,496,703,205,376 |
| /27 | 2,535,301,200,456,458,802,993,406,410,752 |
| /26 | 5,070,602,400,912,917,605,986,812,821,504 |
| /25 | 10,141,204,801,825,835,211,973,625,643,008 |
| /24 | 20,282,409,603,651,670,423,947,251,286,016 |
| /23 | 40,564,819,207,303,340,847,894,502,572,032 |
| /22 | 81,129,638,414,606,681,695,789,005,144,064 |
| /21 | 162,259,276,829,213,363,391,578,010,288,128 |
| /20 | 324,518,553,658,426,726,783,156,020,576,256 |
| /19 | 649,037,107,316,853,453,566,312,041,152,512 |
| /18 | 1,298,074,214,633,706,907,132,624,082,305,024 |
| /17 | 2,596,148,429,267,413,814,265,248,164,610,048 |
| /16 | 5,192,296,858,534,827,628,530,496,329,220,096 |
| /15 | 10,384,593,717,069,655,257,060,992,658,440,192 |
| /14 | 20,769,187,434,139,310,514,121,985,316,880,384 |
| /13 | 41,538,374,868,278,621,028,243,970,633,760,768 |
| /12 | 83,076,749,736,557,242,056,487,941,267,521,536 |
| /11 | 166,153,499,473,114,484,112,975,882,535,043,072 |
| /10 | 332,306,998,946,228,968,225,951,765,070,086,144 |



| | |
|----|---|
| /9 | 664,613,997,892,457,936,451,903,530,140,172,288 |
| /8 | 1,329,227,995,784,915,872,903,807,060,280,344,576 |

IPv6 Subnet Reference Prefix Lengths:

```

2402:9400:0000:0000:0000:0000:0000:0001
XXXX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX
  |||  ||||  ||||  ||||  ||||  ||||  ||||  ||||
  |||  ||||  ||||  ||||  ||||  ||||  |||128
  |||  ||||  ||||  ||||  ||||  ||||  |||124
  |||  ||||  ||||  ||||  ||||  ||||  |120
  |||  ||||  ||||  ||||  ||||  ||||  116
  |||  ||||  ||||  ||||  ||||  |||112
  |||  ||||  ||||  ||||  ||||  ||108
  |||  ||||  ||||  ||||  ||||  |104
  |||  ||||  ||||  ||||  ||||  100
  |||  ||||  ||||  ||||  |||96
  |||  ||||  ||||  ||||  ||92
  |||  ||||  ||||  ||||  |88
  |||  ||||  ||||  ||||  84
  |||  ||||  ||||  |||80
  |||  ||||  ||||  ||76
  |||  ||||  ||||  |72
  |||  ||||  ||||  68
  |||  ||||  |||64
  |||  ||||  ||60
  |||  ||||  |56
  |||  ||||  52
  |||  |||48
  |||  ||44
  |||  |40
  |||  36
  ||32
  |28
  24

```

Note: The IP address above is an IP address allocated to Crucial Paradigm

Source: <https://www.crucial.com.au/blog/2011/04/15/ipv6-subnet-cheat-sheet-and-ipv6-cheat-sheet-reference/>



Please contact support@akcp.com if you have any further technical questions or problems.

Thanks for Choosing AKCP!