Hopping sequences are generated in the following manner:

1. Determine the number of channels in the system. This must be a prime number to guarantee that the hopping sequence generated uses all channels. Our example will use 127 channels.

2. Come up with a fixed channel array that will be stored in each device. This array contains the "slot" to "channel" conversion: the slot is the array index and the channel is the contents of the array at that index. Note that this fixed channel array can be generated in any manner; the only caveat being that once a channel is used in cannot be re-used. The sample fixed channel shown in section A was generated using a standard PRNG (using the rand() function provided by C standard libraries) and throwing out any channels that were already used.

3. To generate the hopping sequence of any particular device, the MAC address of the device must be known. This address is unique for all SSN devices. The MAC address is a 6 byte array. For purposes of this document, MAC[0] refers to the 1st byte of the MAC address and MAC[5] refers to the last byte of the MAC address. Note that the formulae described in this document use C nomenclature. The ^ operator is an EXCLUSIVE-OR operation. The % operator means to perform a MODULO operation. The * operator means to multiply. For purposes of examples, the MAC address we will use is 00:13:50:2a:3f:5c. These are hexadecimal bytes with 00 being the 1st byte and 5c being the last byte.

4. Calculate the sequence start using the following formula:
   Start = ((MAC[3] ^ MAC[4] ^ MAC[5]) % (Number Channels - 1)) + 1
   Start = (((0x2A ^ 0x3F ^ 0x5C) % 126)) + 1 = 74 (decimal)

5. Calculate the sequence seed using the following formula:
   Seed = (MAC[5] % (Number Channels - 1))
   Seed = (0x5C % 126) + 1 = 93 (decimal)

6. Calculate the hopping sequence by looping through all slots, starting from slot 0 and ending at slot = Num channels – 1. For each slot we want to calculate the channel for that slot. To do this, for each slot we calculate the index into the fixed channel array from which to get the channel number. Here is the formula to calculate the index into the fixed channel array:
   Index = (Start + (Slot * Seed)) % Number Channels
        = 74 + (Slot * 93) % 127

7. We can now get a channel for each slot using the above formula to calculate the index into the fixed channel array for each slot.
   Sequence[slot] = Fixed Channel Array[Index]

Example:
   Sequence[0] = Fixed Array[74] = 74; slot 0 is channel 74
   Sequence[1] = Fixed Array[40] = 98; slot 1 is channel 98
   Sequence[2] = Fixed Array[6] = 37; slot 2 is channel 53

```
A. Sample fixed channel array (using 127 channels).

uint8_t ssn_chans[127] = {
 60, 99, 47, 37,  2, 43, 53, 44, 12, 62,  6, 40,115, 78, 46, 82,
113, 10, 13, 58, 87,  3,104, 56, 59, 95, 89,122,125, 16, 52,107,
  8,118, 28, 76, 27, 96, 84, 24, 98, 38, 85, 41, 63, 50,109, 77,
110,124,100,  5, 66,121, 48, 68, 33,117, 19, 22, 80, 91, 11, 17,
 45,119, 35,  1,126,105, 39, 21, 94, 55, 74,  0, 49, 29, 75, 86,
 36, 70, 79, 67, 69,116,111, 25, 14, 73, 23,108, 81, 15, 61,  4,
120, 54, 97, 88,112, 26, 32, 71,114,102, 42, 18, 34,  9, 83,  7,
101, 65, 57, 90, 93,106, 51,123, 72,103, 20, 31, 30, 64, 92};

B. Sample hopping sequence given MAC = 00:13:50:2a:3f:5c
slot=0 chan=74
slot=1 chan=98
slot=2 chan=53
slot=3 chan=88
slot=4 chan=119
slot=5 chan=107
slot=6 chan=30
slot=7 chan=23
slot=8 chan=33
slot=9 chan=104
slot=10 chan=90
slot=11 chan=70
slot=12 chan=77
slot=13 chan=78
slot=14 chan=42
slot=15 chan=94
slot=16 chan=84
slot=17 chan=2
slot=18 chan=54
slot=19 chan=17
slot=20 chan=16
slot=21 chan=20
slot=22 chan=14
slot=23 chan=48
slot=24 chan=87
slot=25 chan=65
slot=26 chan=86
slot=27 chan=50
slot=28 chan=40
slot=29 chan=114
slot=30 chan=39
slot=31 chan=27
slot=32 chan=47
slot=33 chan=4
slot=34 chan=91
slot=35 chan=122
slot=36 chan=72
slot=37 chan=111
slot=38 chan=66
slot=39 chan=13
slot=40 chan=7
slot=41 chan=29
slot=42 chan=41
slot=43 chan=62
```

```
slot=44  chan=32
slot=45  chan=126
slot=46  chan=28
slot=47  chan=60
slot=48  chan=15
slot=49  chan=22
slot=50  chan=95
slot=51  chan=51
slot=52  chan=69
slot=53  chan=100
slot=54  chan=113
slot=55  chan=9
slot=56  chan=0
slot=57  chan=38
slot=58  chan=44
slot=59  chan=112
slot=60  chan=35
slot=61  chan=8
slot=62  chan=64
slot=63  chan=108
slot=64  chan=117
slot=65  chan=56
slot=66  chan=93
slot=67  chan=79
slot=68  chan=110
slot=69  chan=46
slot=70  chan=18
slot=71  chan=55
slot=72  chan=24
slot=73  chan=43
slot=74  chan=97
slot=75  chan=45
slot=76  chan=52
slot=77  chan=31
slot=78  chan=73
slot=79  chan=68
slot=80  chan=3
slot=81  chan=57
slot=82  chan=36
slot=83  chan=109
slot=84  chan=115
slot=85  chan=102
slot=86  chan=21
slot=87  chan=96
slot=88  chan=37
slot=89  chan=120
slot=90  chan=11
slot=91  chan=125
slot=92  chan=103
slot=93  chan=25
slot=94  chan=121
slot=95  chan=58
slot=96  chan=101
slot=97  chan=75
slot=98  chan=63
slot=99  chan=6
slot=100 chan=71
```

```
slot=101 chan=105
slot=102 chan=76
slot=103 chan=99
slot=104 chan=61
slot=105 chan=80
slot=106 chan=89
slot=107 chan=123
slot=108 chan=116
slot=109 chan=5
slot=110 chan=10
slot=111 chan=83
slot=112 chan=49
slot=113 chan=85
slot=114 chan=12
slot=115 chan=26
slot=116 chan=1
slot=117 chan=118
slot=118 chan=92
slot=119 chan=81
slot=120 chan=19
slot=121 chan=59
slot=122 chan=106
slot=123 chan=67
slot=124 chan=124
slot=125 chan=82
slot=126 chan=34
```