SNS Sequence Definitions.

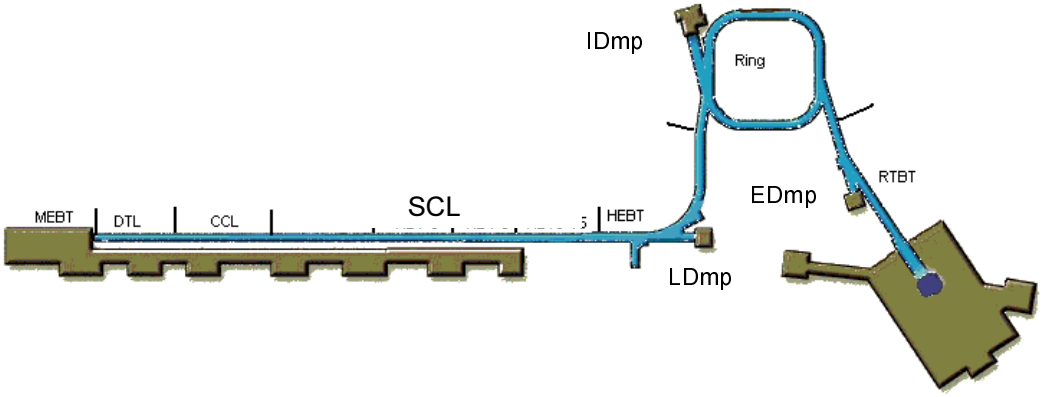
The SNS Controls naming convention describes a framework for dividing the SNS accelerator into pieces. These systems components are shown in figure 1 and they form the basis for the highest level of device and signal naming in the SNS naming convention. Generally the systems follow well-understood boundaries of the SNS project. For the purposes of application programming, it is useful to further sub-divide the systems into sequences. The sequences form the basis of components that will be combined to produce "lattice" sections useful for running commissioning and application programs and for producing modeling lattice input files.

For example, there is a single HEBT system. Sometimes beam will be transported through only the first part of the HEBT and (with the first HEBT dipole turned off) then to the linac dump. Other times beam will be transported through the entire HEBT (with the HEBT dipoles turned on). Thus it is useful to subdivide the HEBT into two sections that can easily be used in either scenario.

The subdivision of the SNS systems into sequences, is accomplished by tagging beamline devices in the Global database. In particular, each Beamline device has a "sequence" record, and a "distance from sequence start" record. This allows the selection of beamline devices by sequence (regardless of name). Additionally, the database includes information describing the total length of each sequence, and which sequences may be placed after each other.

The sequences for the SNS accelerator are defined as in Table 1.

Figure 1. The SNS systems.



- Need a convenient way to combine accelerator sections for modeling purposes.
  - Application programming subdivides SNS systems at “forks in the road”

- The Ring has special issues:
  - Many possible paths for analysis
  - Different specie, with different reference path lengths

- XAL constraint: each node (e.g. magnet) should only be in a single sequence of an accelerator

- Proposed solution:
  - No magnets will be divided and split into multiple sequences. Use the model to start/stop in the middle of a sequence instead.
  - Create different “accelerators” for modeling of different specie (H^+, H^0, H^-), with different reference paths
  - Comparisons of the different paths can be accommodated in an application

Table 1. Proposed sequences for the SNS accelerator application programming:

Sequence	**Description**
MEBT	RFQ exit to start of DTL_Mag:QH100
DTL1	start of DTL_Mag:QH100 to center of DTL_BCM200
DTL2	center of DTL_BCM200 to start of DTL_Mag:QV300
DTL3	start of DTL_Mag:QV300 to center of DTL_BCM400
DTL4	center of DTL_BCM400 to start of DTL_Mag:QH500
DTL5	start of DTL_Mag:QH500 to center of DTL_BCM600
DTL6	center of DTL_BCM600 to start of CCL_Mag:QH00
CCL1	start of CCL_Mag:QH00 to center of CCL_Vac:GV1
CCL2	center of CCL_Vac:GV1 to center of CCL_Vac:GV2
CCL3	center of CCL_Vac:GV2 to center of CCL_Vac:GV3
CCL4	center of CCL_Vac:GV3 to center of CCL_Vac:GV4
SCLMed	center of CCL_Vac:GV4 to center of SCL_Vac:GV12a
SCLHigh	center of SCL_Vac:GV12a to ???
HEBT1	start of HEBT:QV1 to start of the first HEBT dipole
HEBT2	start of 1st HEBT dipole to injection foil
LDmp	Start of the first HEBT dipole to the linac dump

Ring1 *	Start of the 1st Injection bump to end of the 1st injection septum
Ring2 *	End of 1st injection septum to start of 2nd Injection Septum
Idmp *	Start of 2nd injection septum to the injection dump
Ring3	Start of 2nd Injection Septum to end of last injection bump
Ring4	End of the last injection bump to start of first extraction kicker
Ring5	Start of first extraction kicker to start of Extraction Septum
Ring6	Start of Extraction Septum to start of the 1st injection bump magnet
RTBT1	Start of extraction septum to start of first RTBT dipole
RTBT2	Start of the first RTBT dipole to the target
Edmp	Start of the first RTBT dipole to the extraction dump

* will be in s eparate “accelerators” to accommodate different specie.