

## **[Interconnect Port Order]**

Rules for Version 1.0 Files:

The [Interconnect Port Order] keyword is not permitted in Version 1.0 files.

Rules for Version 2.0 Files:

Each Touchstone® Version 2.0 file may contain one and only one [Interconnect Port Order] keyword and subparameters. The [Interconnect Port Order] keyword, subparameters and associated data define how passive interconnect ports are arranged, either as near- or far-end.

The [Interconnect Port Order] keyword must appear on a line by itself, and must be followed on the immediately subsequent line by the subparameter Near\_End. This subparameter is followed by a list of positive integers, corresponding to the ports associated with one side of the passive interconnects represented by network data later in the file. The list of integers may span multiple lines, but must terminate in a newline character.

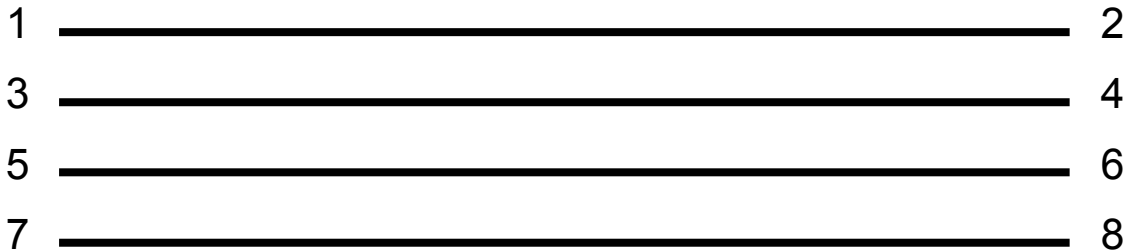
The next line following the list of Near\_End ports must begin with the subparameter Far\_End. This subparameter is followed by a list of positive integers, corresponding to the ports associated with the opposite side of the same passive interconnects represented by network data later in the file. The list of integers may span multiple lines, but must terminate in a newline character.

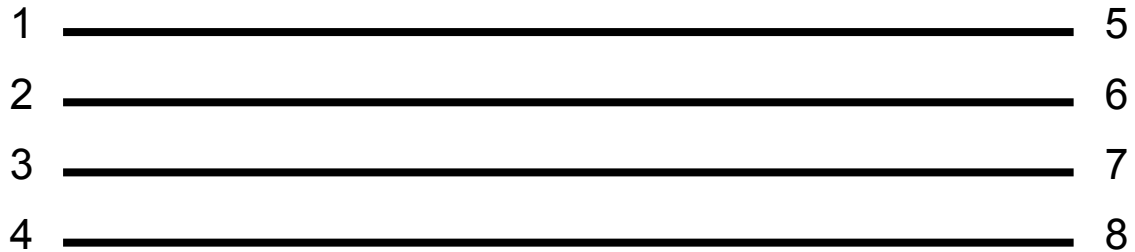
The Near\_End subparameter integer lists may not contain any values also present in the Far\_End subparameter integer list. Near\_End and Far\_End may only appear once under [Interconnect Port Order]. The integers listed under Near\_End and Far\_End are not required to be presented in numerically-ascending order, as the port assignment used for data collection may not have been so ordered.

The highest integer present in the Near\_End or Far\_End list must be less than or equal to the [Number of Ports] entry. The number of ports listed under the Near\_End subparameter must be equal to the number of ports listed under the Far\_End subparameter. The total number of ports under Near\_End and Far\_End must be an even number.

The [Interconnect Port Order] keyword and subparameters are optional for Version 2.0 files. If used, these must only appear after the [Version] keyword and before any network data.

The [Interconnect Port Order] keyword shows the relationship of a passive interconnect system to the port ordering (and therefore row and column ordering) of the network data later in the file. This permits unambiguous interpretation of the network data's transmission, reflection and coupling components. The figures below illustrate two possible port ordering schemes for simple interconnects where ambiguity could cause network data to be misinterpreted.





**Example xx (Version 2.0):**

```
! 4-port S-parameter data
! The data was taken from two coupled PCB traces
! Line 1 is defined by ports 1 and 2, with port 1 at the near end
! Line 2 is defined by ports 3 and 4, with port 3 at the near end
[Version] 2.0
# GHz S MA R 50
[Number of Ports] 4
[Interconnect Port Order]
Near_End 1 3
Far_End 2 4
[Number of Frequencies] 1
5.00000 0.60 161.24 0.40 -42.20 0.42 -66.58 0.53 -79.34 !row 1
        0.40 -42.20 0.60 161.20 0.53 -79.34 0.42 -66.58 !row 2
        0.42 -66.58 0.53 -79.34 0.60 161.24 0.40 -42.20 !row 3
        0.53 -79.34 0.42 -66.58 0.40 -42.20 0.60 161.24 !row 4
```

**Comments – Not to be included in specification**

- We do not require that this keyword \*exhaustively\* list all the available ports, in case we have a system that doesn't conveniently split into near and far, e.g. a y-splitter network. Therefore, there is no enforcement that the [Number of Ports] entry and the highest integer under Near\_End/Far\_End are equal.
- The association of ports with lines of interconnect is indirect; in other words, we only list out the individual ports on the near or far side. We don't actually pair them in the syntax, but by implication. This preserves flexibility to define mixed-mode structures later.
- This priorities human-readable syntax with a minimum of extra characters over representations featuring more arcane symbols.