

## Project WAN1

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## Network Workbench

- ❑ A simulation software that creates a “virtual reality” of an Internet-like networking environment
- ❑ Available at `site-unix` in directory </home/courses/csnet/nw42>.
- ❑ On `site-unix`, follow the instructions in `Sun-setup.txt` in the above directory to install a 7-node network.
- ❑ PC versions are available at <http://netlab.gmu.edu/NW>

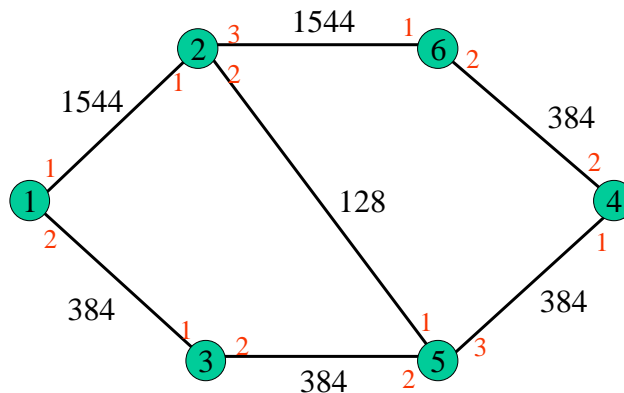
## Project WAN 1

- Your assignment is to write a function `network::create_topology()` in file `topo.cpp`, which uses data structures
  - `int nnets`, the number of subnets in the network
  - `int nlinks`, the number of links in the network
  - `int links[MAX_NETS+1][MAX_NETS+1]`, `links[i][j]` gives the data rate in kbps of the link connecting router  $i$  and router  $j$  (if there is no such link, the rate is 0)
- **Output:** data structures `exit_interfaces`, `nports`, and `interfaces`.

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## An Example of Network Topology



- **Attention:** this example is drawn from a 6-node topology; expect your results to be different.

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## Data structure `links[ ][ ]`

links matrix

to:	1	2	3	4	5	6
from						
1	0	1544	384	0	0	0
2	1544	0	0	0	128	1544
3	384	0	0	0	384	0
4	0	0	0	0	384	384
5	0	128	384	384	0	0
6	0	1544	0	384	0	0

Note that router/subnet number 0 is not used.

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## Data Structure

### `int exit_interfaces[ ][ ]`

to:	1	2	3	4	5	6
From						
1	-1	1	2	-1	-1	-1
2	1	-1	-1	-1	2	3
3	1	-1	-1	-1	2	-1
4	-1	-1	-1	-1	1	2
5	-1	1	2	3	-1	-1
6	-1	1	-1	2	-1	-1

In this project, do not use interface number 0 -- it is used by a router to reach its local hosts.

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## Data structure interfaces[ ]

**Purpose:** a list of all interfaces (or ports) in the entire network

**Declaration:**

```
typedef struct {
    byte net;    // subnet/router number
    byte host;   // discard it for now
    byte ifacenum;
    byte other_end;
} iface;
iface interfaces[Max_BYTE]; // MAX_BYTE=255
```

**Example:**

interfaces structure for WAN

port_id:	0	1	2	3	4	5	6	7	8	9	10	11	12	13
router:	1	1	2	2	2	3	3	4	4	5	5	5	6	6
iface:	1	2	1	2	3	1	2	1	2	1	2	3	1	2
other_end:	2	5	0	9	12	1	10	11	13	3	6	7	4	8

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- ❑ All these data structures are defined in  
`/home/courses/csnet/nw42/code/nw.h`
  - Study this header file whenever you have problems about NW data structures.
- ❑ To compile, use the command “`cwkb wan1`” in your local `nw42` directory.
- ❑ To see NW solutions, comment out `#include"topo.cpp"` in file `wan1.cpp` before compilation.
- ❑ Read Chapter 1 and 2 of Dr. Pullen’s textbook “Understanding Internet Protocols” for additional information.

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## Submission

- We will use an online upload system for all project submissions.
- You first need to get a password by providing your GMU ID at <http://www.cs.gmu.edu/course-upload/get-pass.html>.
- Use the password to login to **[www.cs.gmu.edu/course-upload](http://www.cs.gmu.edu/course-upload)**.
- Click on project wan1 and upload two files `topo.cpp` and the outcome of your program.

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## Deadline

- Due midnight Feb. 4th.
- Late submission with 20% penalty: midnight of Feb. 6th.
- All projects must be individual efforts.
- The 10-day project time is an exception, to take into account the beginning of the semester.
- You should expect 7-day project times in general.

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