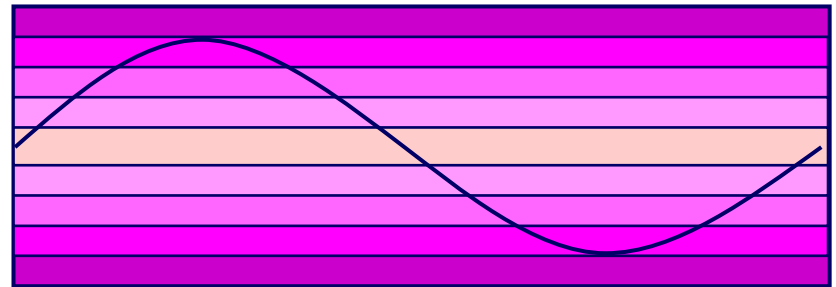
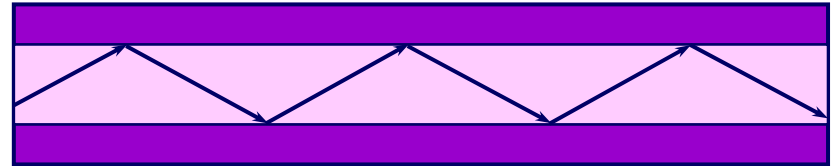


TRANSMISSION MEDIA

Optical Fibers

- **First generation fibers**
(multimode, step index)
 - two materials
 - diameter: 200 micron
- **Second generation fibers**
(multimode, graded index)
 - about 50 layers of different silica types
 - diameter: 50 micron
- **Third generation fibers**
(single mode)
 - diameter: 9 micron

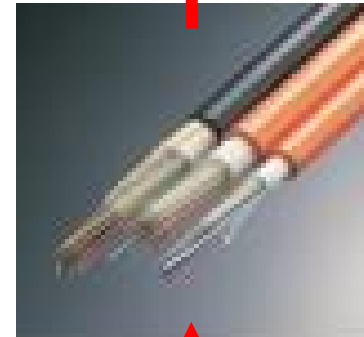
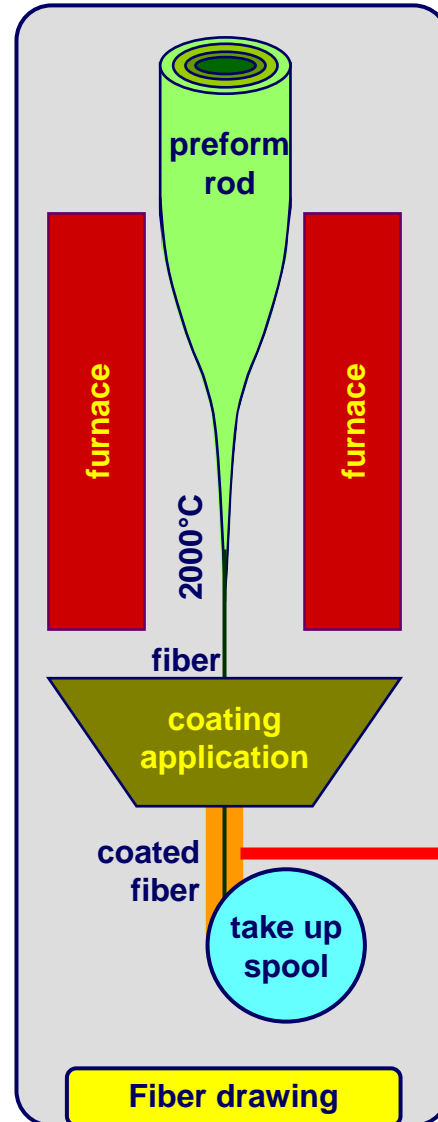
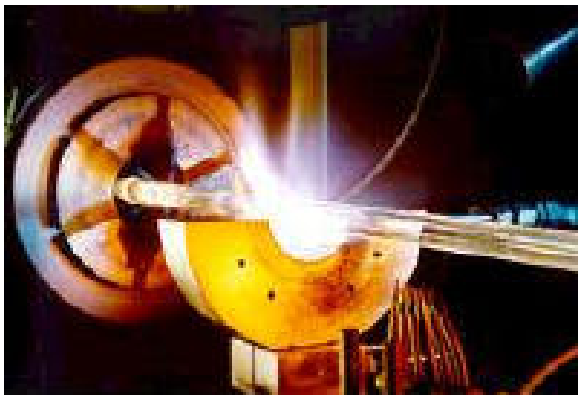
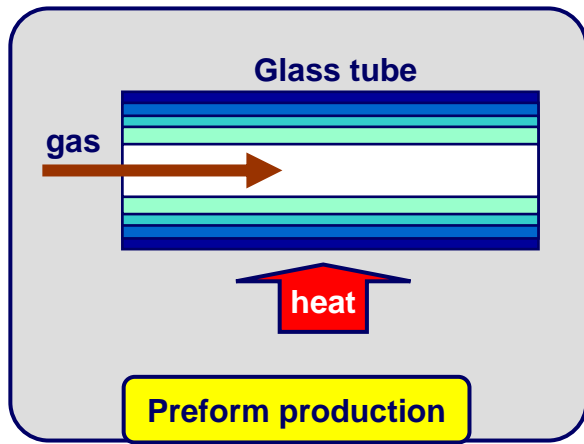


Human hair diameter: 100 micron

TRANSMISSION MEDIA

Optical Fibers

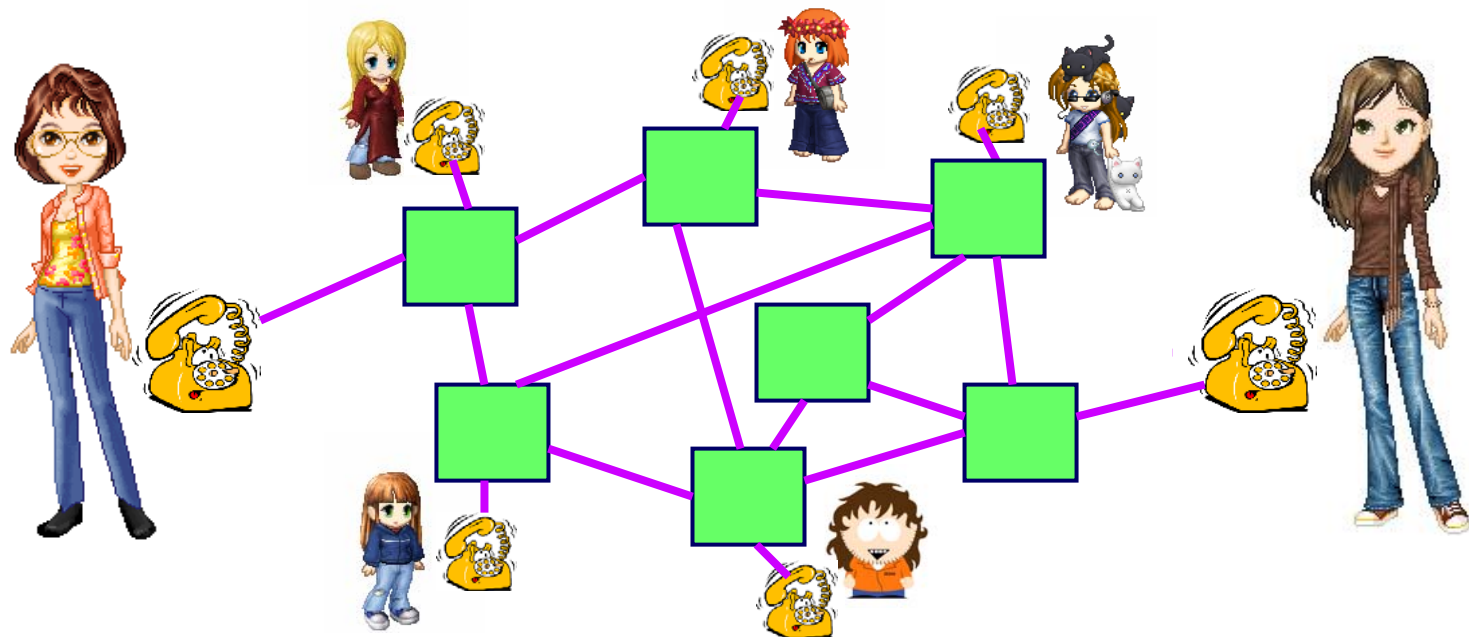
The manufacturing process



THE NEED FOR COMMUNICATIONS EQUIPMENT

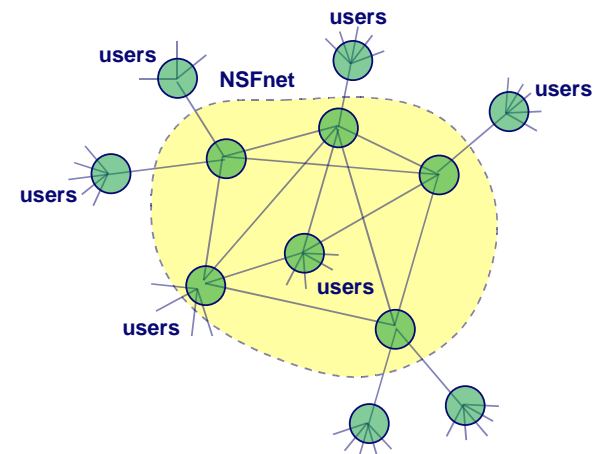


- Sound is attenuated by transmission media (air)
- Communications equipment is needed to:
 - Solve the distance problem
 - Route the signals to their correct destination



HISTORY OF THE INTERNET

- 1960s - ARPANET - packet switching project in US.
- 1970s - ARPANET grew to support many organizations related to US Department of Defense, US Government and research institutions.
- 1985
 - US National Science Foundation (NSF) creates 5 national supercomputer centers, to be available to universities in US.
 - NSF connects the 5 sites with 56 Kbps lines and allows universities to connect to this network for the original purpose of having access to the 5 super computers.
 - Soon users discovered that the connections may be used for e-mail, file transfer and other services, not related to the 5 supercomputers.



FREQUENCY HOPPING SPREAD SPECTRUM

A word of gratitude to Hedy LAMARR - The Beauty and the Brain

- **Born on November 9, 1913 in Vienna, Austria, as Hedwig Eva Maria KIESLER**
- **Studies acting and dreams of becoming a movie star**
- **At 17 (in 1930) she becomes a star! She is the first woman to appear nude in a major motion film: the Czech film titled “Ecstasy”.**
- **The film is banned at the time in US!**
- **Married in 1933 to Austrian armament manufacturer Fritz MANDL**
- **Proud of his gorgeous and famous wife, Mandl takes her to all his business meetings; she entertains and . . . listens carefully and learns a lot.**
- **She personally meets Hitler and Mussolini**
- **In 1937 she dramatically escapes her pro-Nazi husband, making her way to London, then to US, where she is offered a contract by MGM Studios and asked to change her name to Hedy LAMARR.**

