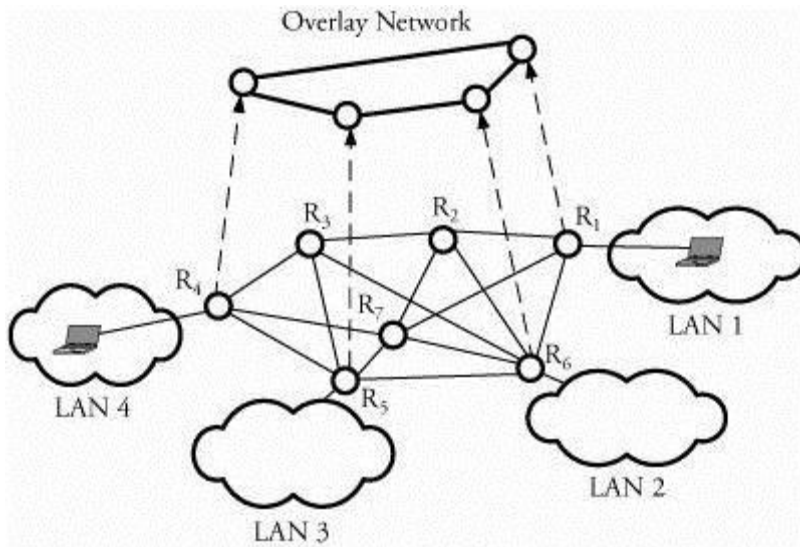


OVERLAY NETWORKS

An overlay network is an application-specific computer network built on top of another network. In other words, an overlay network creates a virtual topology on top of the physical topology. This type of network is created to protect the existing network structure from new protocols whose testing phases require Internet use. Such networks protect packets under test while isolating them from the main networking infrastructure in a test bed.

[Figure 6.11](#) shows an overlay network configured over a wide area network. Nodes in an overlay network can be thought of as being connected by logical links. In [Figure 6.11](#), for example, routers R₄, R₅, R₆, and R₁ are participating in creating an overlay network where the interconnection links are realized as overlay logical links. Such a logical link corresponds to a path in the underlying network. An obvious example of these networks is the peer-to-peer network, which runs on top of the Internet. Overlay networks have no control over how packets are routed in the underlying network between a pair of overlay source/destination nodes. However, these networks can control a sequence of overlay nodes through a message-passing function before reaching the destination.

Figure 6.11. An overlay network for connections between two LANs associated with routers R₁ and R₄



For various reasons, an overlay network might be needed in a communication system. An overlay network permits routing messages to destinations when the IP address is not known in advance. Sometimes, an overlay network is proposed as a method to improve Internet routing as implemented in order to achieve higher-quality streaming media. Sometimes, for the implementation of such techniques as DiffServ and IP multicast, modification of all routers in the network is required. In such cases, an overlay network can be deployed on end hosts running the overlay protocol software, without cooperation from Internet service providers.

Overlay networks are self-organized. When a node fails, the overlay network algorithm should provide solutions that let the network recover and recreate an appropriate network structure. Another fundamental difference between an overlay network and an unstructured network is that overlays' look-up routing information is on the basis of identifiers derived from the content of moving frames.