A protocol stack refers to a group of protocols that are running concurrently that are employed for the implementation of network protocol suite.

The protocols in a stack determine the interconnectivity rules for a layered network model such as in the OSI or TCP/IP models. To become a stack the protocols must be interoperable being able to connect both vertically between the layers of the network and horizontally between the end-points of each transmission segment.

The protocol stack is used to allow the combination of different protocols that each set the boundaries for a number of network activities.

Historically, only networks that complied with certain technologies could communicate. This became more and more prevalent as the users and owners of systems increasingly wanted to be able to share data.

Sharing data over any network means that both ends must agree on how the data is to be sent. Regardless of the type of communication, whether it is a packet switched digital network or an old-style 1200 baud modem; they can only communicate with equipment that follows the same protocol at each end of the network. Multi layered networks split the components down into layers so that the data is not affected by the mode of transmission, the mode of transmission is not affected by the hardware, the hardware is not affected by the synchronicity of the equipment. These functions are all separated into separate 'layers' of data that all require a protocol to be transferred. So the transport layer for example, responsible for the physical transfer of data, will have a range of protocols which can be used to communicate the data. The Data Link layer has other protocols associated with its data type and is responsible for the addressing of data from the other layers.

These different protocols cannot be combined because that could create sets of rules that are too complex to carry out and incompatible in function. Having different protocols in the different layers of a network is a solution but an essential part of this is to be able to communicate with each other to enable an overall function to take place (i.e. a transfer of data across a network). When protocols are able to interact in such a way so in a combined activity, such as in TCP/IP and the OSI model, they are called a protocol stack.