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a spanning tree is a subset of graph G such that all the vertices are connected using minimum possible number of edges hence a spanning tree does not have cycles and a graph may have more than one spanning tree a spanning tree is a sub graph of an undirected and a connected graph which includes all the vertices of the graph having a minimum possible number of edges in this tutorial you will understand the spanning tree and minimum spanning tree with illustrative examples a spanning tree blue heavy edges of a grid graph in the mathematical field of graph theory a spanning tree T of an undirected graph G is a subgraph that is a tree which includes all of the vertices of G this lesson is an introduction to spanning tree you will learn why we need it how it works and how you can check the spanning tree topology on your cisco switches why do we need spanning tree what is a loop and how do we get one the spanning tree protocol stp is a network protocol that builds a loop free logical topology for ethernet networks the basic function of stp is to prevent bridge loops and the broadcast radiation that results from them spanning trees are special subgraphs of a graph that have several important properties first if T is a spanning tree of graph G then T must span G meaning T must contain every vertex in G second T must be a subgraph of G in other words every edge that is in T must also appear in G a bpdu is an stp frame it includes all the information stp pvst needs to learn and build the network topology listening in this state the switch removes the old cam table entries switches use cam table entries to make forwarding decisions each cam table entry has a default age out timer the stp algorithm the spanning tree algorithm performs a couple of steps to make sure that the topology is loop free and ethernet is going to work correctly electing a root bridge the very first thing that stp does is to elect a root bridge this is the most important switch in the topology it will be the root of the loop free tree the spanning tree protocol stp plays a pivotal role in ensuring network stability and preventing loops in ethernet based networks understanding stp is crucial for network administrators and engineers to build robust and fault tolerant network infrastructures the significance of a spanning tree is that it is a minimal spanning set a smaller set would not span the graph while a larger set would have a cycle which has an edge that is superfluous for the remainder of this section we will discuss two of the many topics that relate to spanning trees stp is a layer 2 link management protocol that provides path redundancy while preventing loops in the network for a layer 2 network to function properly only one active path can exist between any two stations a spanning tree of a connected undirected graph is a subgraph that includes all the vertices of the original graph while still being a tree in other words a spanning tree is a tree that spans or covers all the vertices of the original graph a spanning tree is a connected graph using all vertices in which there are no circuits in other words there is a path from any vertex to any other vertex but no circuits some examples of spanning trees are shown below spanning tree protocol prevent looping of frames around lan by placing ports of switch in either forwarding or blocking state interfaces ports of switch which are in forwarding state act as normally but interfaces in blocking state doesn't process any frame received except stp messages and other important overheads spanning tree in this article we will discuss the spanning tree and the minimum spanning tree but before moving directly towards the spanning tree let's first see a brief description of the graph and its types a spanning tree is a subset of graph G which has all the vertices covered with minimum possible number of edges hence a spanning tree does not have cycles and it cannot be disconnected by this definition we can draw a conclusion that every connected and undirected graph G has at least one spanning tree strictly in the context of computer science what is the difference between a spanning tree and minimum spanning tree i read this posts but was unsatisfied with the answer because it did not seem relevant to computer science a spanning tree of a graph is a subgraph that includes all the vertices of the original graph and is also a tree a connected acyclic graph the primary goal of a spanning tree is to connect all vertices with the minimum number of edges uses of spanning tree if we carry out either of the depth first or breadth first search algorithms but aren't looking for a path between specific vertices the end result will be a spanning tree for the original graph definition depth first spanning tree as spanning tree has minimum number of edges removal of any edge will disconnect the graph therefore option b is also true as all edge weights are distinct G will have a unique minimum spanning tree 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