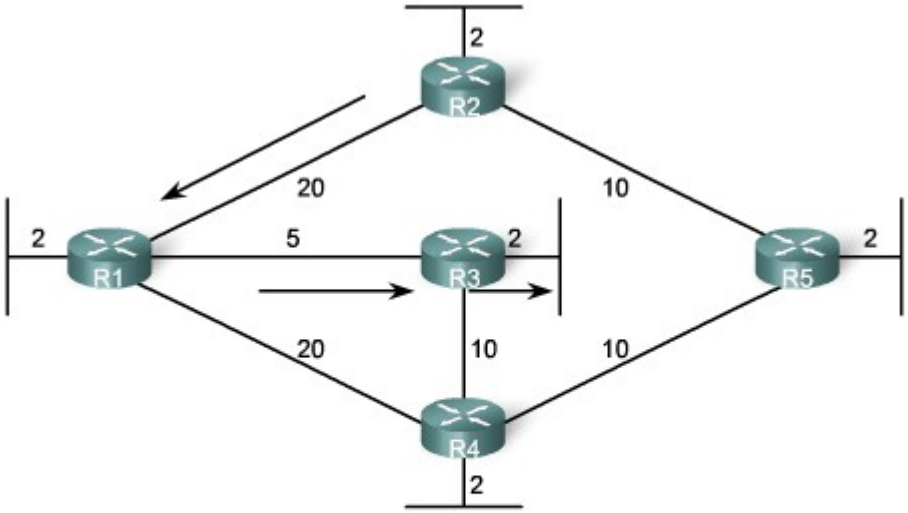
LINK STATE ROUTING ALGORITHM

Also known as Shortest path Routing algorithm.

Link states:

Information about the state of (Router interfaces) links is known as link-states. As you can see in the figure, this information includes:

- The interface's IP address and subnet mask.
- The type of network, such as Ethernet (broadcast) or Serial point-to-point link.
- The cost of that link.
- Any neighbor routers on that link.



Shortest Path for host on R2 LAN to reach host on R3 LAN:
R2 to R1 (20) + R1 to R3 (5) + R3 to LAN (2) = 27

So exactly ho g generic link-

state routing process to reach a state of convergence:

1. **Each router learns about its own links, its own directly connected networks.** This is done by detecting that an interface is in the up state.

2. **Each router is responsible for meeting its neighbors on directly connected networks.** link state routers do this by exchanging Hello packets with other link-state routers on directly connected networks.

3. **Each router builds a Link-State Packet (LSP) containing the state of each directly connected link.** This is done by recording all the pertinent information about each neighbor, including neighbor ID, link type, and bandwidth.

4. **Each router floods the LSP to all neighbors, who then store all LSPs received in a database.** Neighbors then flood the LSPs to their neighbors until all routers in the area have received the LSPs. Each router stores a copy of each LSP received from its neighbors in a local database.

5. **Each router uses the database to construct a complete map of the topology and computes the best path to each destination network**. Like having a road map, the router now has a complete map of all destinations in the topology and the routes to reach them. The SPF algorithm is used to construct the map of the topology and to determine the best path to each network.

Advantages of Link state Routing protocol:

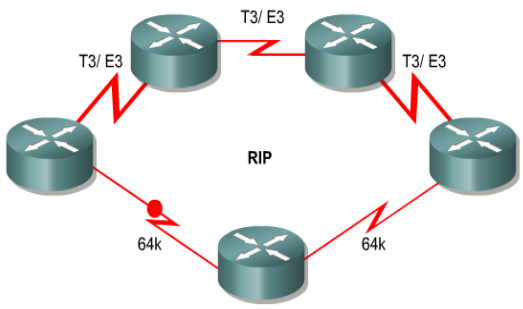
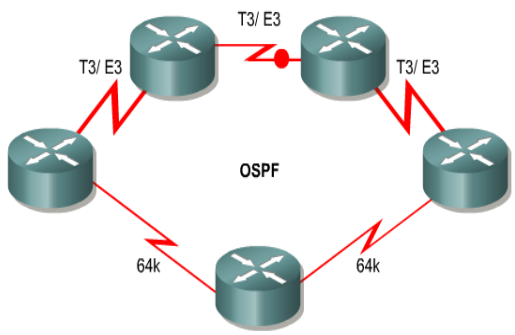
Build the topological map:
Link-state routing protocols create a topological map, or SPF tree of the network topology. Distance vector routing protocols do not have a topological map of the network.

Faster Convergence:
When receiving a Link-state Packet (LSP), link-state routing protocols immediately flood the LSP out all interfaces except for the interface from which the LSP was received. This way, it achieve the faster convergence. With distance vector routing algorithm, router needs to process each routing update and update its routing table before flooding them out other interfaces.

Event Driven Updates:
After the initial flooding of LSPs, link-state routing protocols only send out an LSP when there is a change in the topology. The LSP contains only the information regarding the affected link. Unlike some distance vector routing protocols, link-state routing protocols do not send periodic updates.

Distance vector vs. Link state:

Sno.	Distance Vector	Link State
1	Uses hop count as Metric.	Uses shortest path.
2	View the network from the perspective of neighbor.	Gets common view of entire network topology.
3	Has frequent and periodic updates	Has event triggered updates.
4	Slow convergence	Faster convergence

5	Susceptible to routing loops.	Not as susceptible to routing loops.
6	Easy to configure and administer.	Difficult to configure and administer.
7	Requires less memory and processing power of routers.	Requires more precessing power and memory than distance vector.
8	Consumes a lot of Bandwidth.	Consumes less BW than distance vector.
9	Passes copies of routing table to neighbor routers.	Passes link-state routing updates to other routers.
10	Eg. RIP 	Eg. OSPF 

Flow based routing:
A flooding algorithm is an algorithm for distributing material to every part of a connected network. The name derives from the concept of inundation by a flood. Its implemented by the ospf:

Advantages of Flooding
The main advantage of flooding the increased reliability provided by this routing method. Since the message will be sent at least once to every host it is almost guaranteed to reach its destination. In addition, the message will reach the host through the shortest possible path.

Disadvantages of Flooding
There are several disadvantages with this approach to routing. It is very wasteful in terms of the networks total bandwidth. While a message may only have one destination it has to be sent to every host. This increases the maximum load placed upon the network.

Messages can also become duplicated in the network further increasing the load on the networks bandwidth as well as requiring an increase in processing complexity to disregard duplicate messages.

A variant of flooding called *selective flooding* partially addresses these issues by only sending packets to routers in the same direction.

Source : http://dayaramb.files.wordpress.com/2011/03/computer-network-notes-pu.pdf