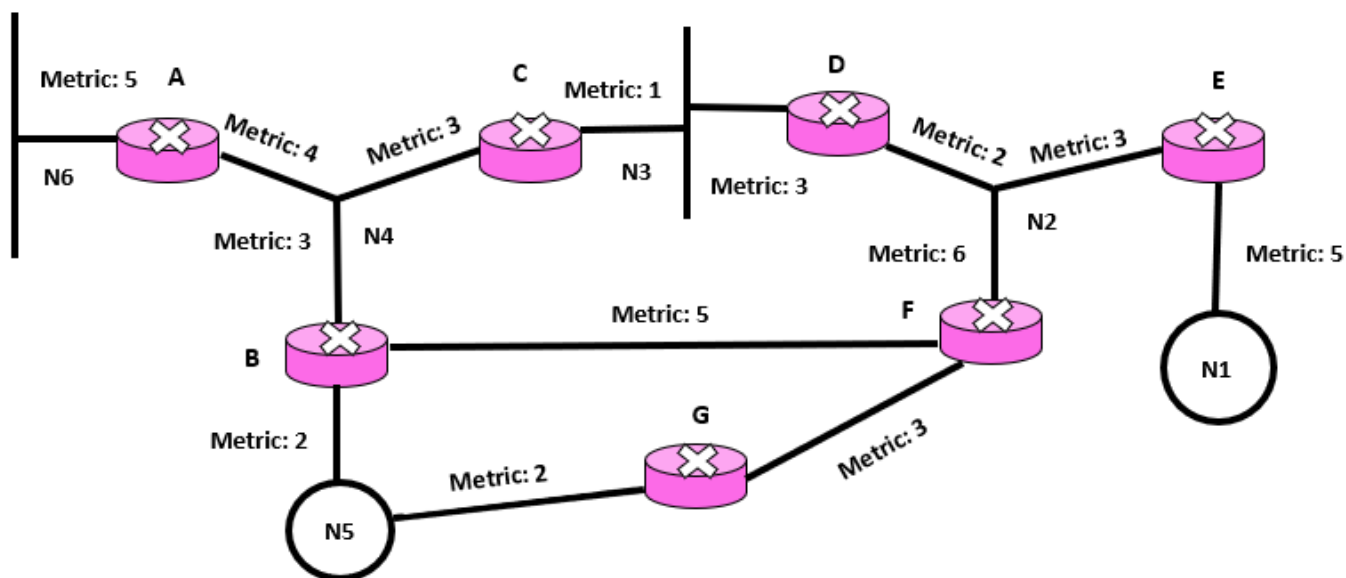


پروتکل مسیریابی مبتنی بر وضعیت لینک^۱

سوال اول - مثال زیر از شبکه‌های متصل به هم را در نظر بگیرید:



الف) نوع هر یک از لینک‌های موجود در توپولوژی را مشخص کنید.

پاسخ:

Stub	Transient	Point to point
A → N6	A, B, C → N4	B → F
E → N1	B, G → N5	F → G
	C, D → N3	
	D, E, F → N2	

ب) هزینه انتقال بسته در هر یک از موارد زیر را با ذکر مسیر و هزینه گام به گام مشخص کنید.

- از مسیریاب A به مسیریاب F
- از مسیریاب E به مسیریاب G
- از مسیریاب A به مسیریاب E

¹ Link State



پاسخ:

• از مسیر یاب A به مسیر یاب F

- Total path : $A \rightarrow N4 \rightarrow C \rightarrow N3 \rightarrow D \rightarrow N2 \rightarrow F \Rightarrow 4+1+2=7$

Path	Cost(metric)
$A \rightarrow N4$	4
$N4 \rightarrow C$	No cost
$C \rightarrow N3$	1
$N3 \rightarrow D$	No cost
$D \rightarrow N2$	2
$N2 \rightarrow F$	No cost

• از مسیر یاب E به مسیر یاب G

- Total path : $E \rightarrow N2 \rightarrow F \rightarrow G \Rightarrow 3+3=6$

Path	Cost(metric)
$E \rightarrow N2$	3
$N2 \rightarrow F$	No cost
$F \rightarrow G$	3

• از مسیر یاب A به مسیر یاب E

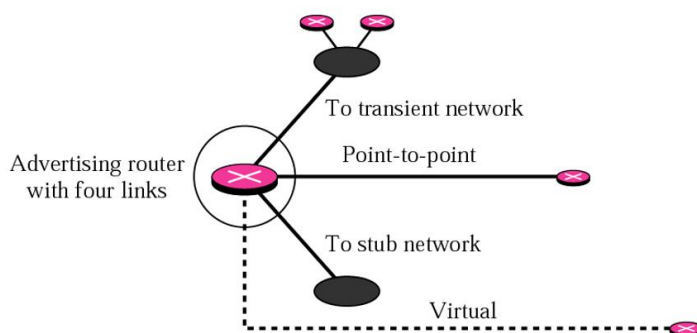
- Total path : $A \rightarrow N4 \rightarrow C \rightarrow N3 \rightarrow D \rightarrow N2 \rightarrow E \Rightarrow 4+1+2=7$

Path	Cost(metric)
$A \rightarrow N4$	4
$N4 \rightarrow C$	No cost
$C \rightarrow N3$	1
$N3 \rightarrow D$	No cost
$D \rightarrow N2$	2
$N2 \rightarrow E$	No cost

ج) مسیر یاب B چه Router Link هایی را گزارش می کند؟

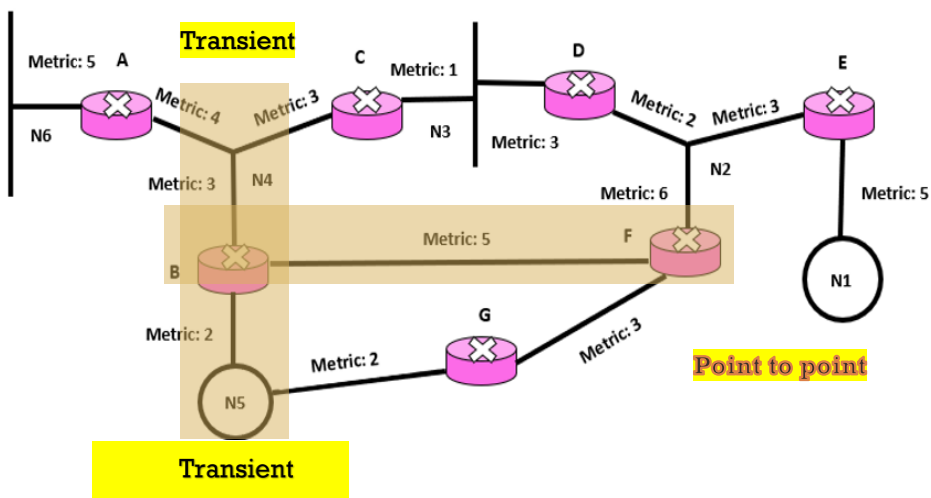
پاسخ: همانطور که در اسلاید درس داشتیم روتر لینک ها در حالت کلی به صورت زیر هستند :

Router link

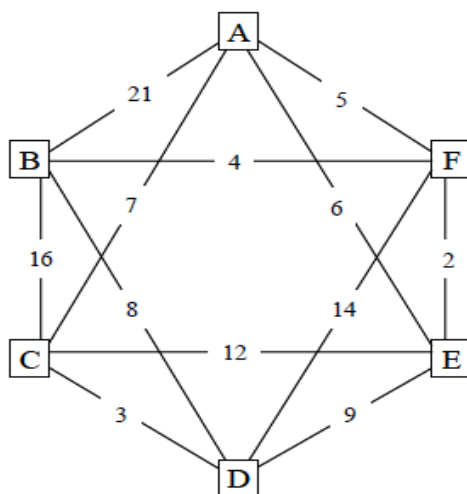


اتصالات روتر B به N4 , N5 , F برقرار است .

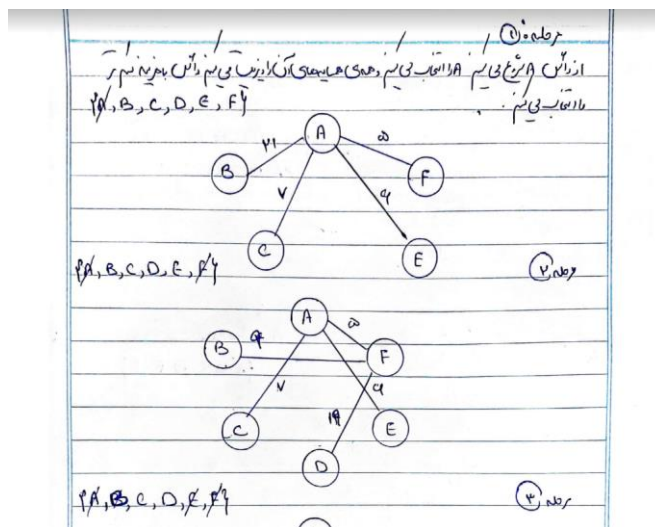
Transient	Point to point
A, B, C → N4	B → F
B, G → N5	



سوال دوم - با فرض استفاده از پروتکل OSPF، به صورت مرحله به مرحله روند یافتن کوتاه‌ترین مسیرها را در مسیریاب A با لحاظ استفاده از روش دیجسترا^۲ رسم کنید.

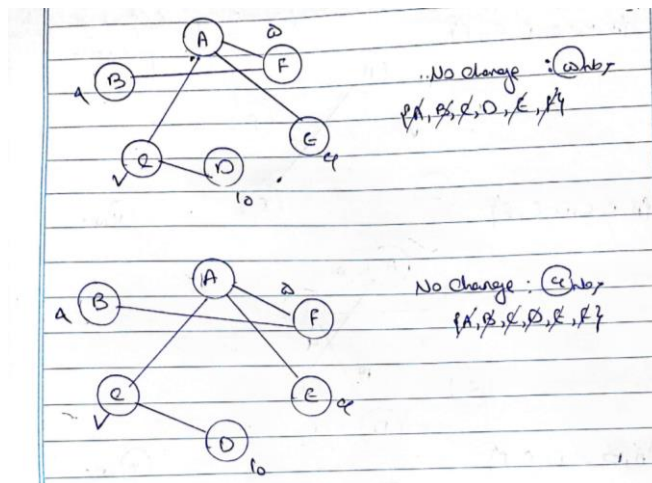
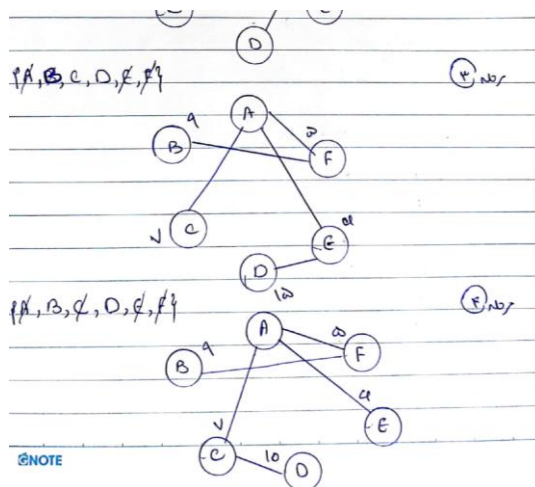


پاسخ:



² Dijkstra

پاسخ:



Node	Distance to "A"
A	0
B	4
C	5
D	10
E	9
F	2



تمرین درس شبکه
(مبحث پروتکل OSPF)
نام و نام خانوادگی:

سوال سوم - جدول زیر را در بیان تفاوت‌های میان پروتکل‌های مسیریابی RIP و OSPF تکمیل کنید. در ردیف مربوط به قابلیت‌های مورد پشتیبانی مواردی از قبیل پشتیبانی از چندین معیار^۳، پشتیبانی از چند ناحیه^۴، پشتیبانی از مسیریابی بین دامنه‌ای^۵، احراز هویت^۶، چندپخش^۷،

توضیح صفحه پایین

³ Multiple metrics

⁴ Multiple areas

⁵ Inter-domain routing

⁶ Authenticati

⁷ Multicasting



	RIP	OSPF
نوع پروتکل مسیریابی	Distance Vector protocol	Link-state protocol
الگوریتم مسیریابی (نحوه یافتن مسیر)	Bellman-Ford algorithm	Dijkstra algorithm
قابلیت‌های مورد پشتیبانی ^۸	<p>1. پشتیبانی از classfull</p> <p>2. ورژن دو از احراز هویت پشتیبانی می‌کند</p> <p>3. RIP uses the number of hops, or hop count, to determine the best possible route to a host or network. The term hop count is also referred to as the metric. In RIP, a hop count of 16 means infinity, or that the destination cannot be reached.</p> <p>4. Split horizon</p> <p>5. In the same way, RIP can support maximum upto 15 hops, which means that the 16 routers can be configured in a RIP.</p> <p>6. RIP is an intra-domain routing protocol used within an autonomous system. Here, intra-domain means routing the packets in a defined domain, for example, web browsing within an institutional area.</p> <p>7. RIPv2 provides authentication support so that RIP links can require authentication keys (passwords) before they become active. Authentication provides an additional layer of security on the network beyond the other security features. By default, this authentication is disabled.</p> <p>8. RIP sends out messages that contain the complete routing table to every neighboring router every 30 seconds. These messages</p>	<p>1. از classless هم پشتیبانی می‌کند</p> <p>2. از احراز هویت پشتیبانی می‌کند</p> <p>3. OSPF uses a cost metric that represents the status of the link and the bandwidth of the interface in an algorithm to determine the best route to a destination. The algorithm used is called the SPF (shortest path first) or Dijkstra algorithm.</p> <p>4. With multi-area adjacency, a single physical link (router interface) can belong to multiple OSPF areas. Now we have multiple intra-area paths sharing the same physical link. Important notes about multi-area solution: You must configure OSPF on the primary interface. Link type must be point-to-point.</p> <p>6. OSPF is an interdomain routing protocol. OSPF uses a Dijkstra-like algorithm to implement least cost path routing. OSPF is an intra-domain routing protocol. The Open Shortest Path First (OSPF) Internet routing protocol implements a Bellman-Ford distance-vector routing algorithm.</p> <p>7. OSPF can be configured to authenticate every OSPF message. This is usually done to prevent a rogue router from injecting false routing information and therefore causing a Denial-of-Service attack</p> <p>8. OSPF uses multicast functions when interfaces are attached to broadcast networks, such as Ethernet. For all OSPF routers, these interfaces are joined to multicast address 224.0.0.5.</p>

⁸ Supports



	are normally sent as multicasts to address 224.0.	
مقیاس پذیری ⁹	<p>Small networks</p> <p>RIPv1 floods routes frequently (every 30 seconds), which introduces large CPU loads as the size of the routing table increases. This is compounded by the reality that RIP recalculates metrics for every route, every time it floods the route out a new interface (regardless of whether there was a topology change or not). As the number of routes increases, this prevents RIP from scaling as well as other protocols.</p>	<p>Enterprise network</p> <p>designed explicitly to support the scalability, availability and functional requirements of OEMs building devices for next generation networks</p>
پیچیدگی ¹⁰	Simple	Relatively complex "More complex"
جلوگیری از ایجاد حلقه ¹¹	<p>YES</p> <p>RIP uses the following mechanisms to prevent routing loops:</p> <p>Counting to infinity—A destination with a metric value of 16 is considered unreachable. ...</p> <p>Split horizon—Disables RIP from sending routing information on the interface from which the information was learned to prevent routing loops and save bandwidth.</p>	<p>OSPF is a routing protocol that, by design, has built-in loop prevention mechanisms to mitigate against routing loops.</p> <p>First, as a link-state protocol, it enables each router to have a complete map of the network. This helps in preventing most routing loops.</p> <p>Secondly, as OSPF networks get larger, they are separated into distinct areas. These areas are all obligated to connect to area 0, thus creating a loop-free inter-area topology where traffic from one area to another must go through area 0.</p> <p>This whole design of OSPF helps to alleviate the possibility of having routing loops. There is no "loop avoidance" technique employed by OSPF since loop avoidance is built into the shortest path first (SPF) algorithm.</p>

⁹ Scalability

¹⁰ Complexity

¹¹ Loop avoidance



تمرین درس شبکه
(مبحث پروتکل OSPF)
نام و نام خانوادگی:

		<p>Routing loops may be introduced into OSPF whenever you interconnect with other routing domains running different routing protocols, especially if you have two or more connections to these other domains. In such cases, other techniques such as route tagging should be used to avoid routing loops.</p>
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