

5a:

Upon doing usual browsing, I noticed these five protocols, which were not discussed in class.

1. **MDNS**: multicast DNS, it resolves hostnames to IP addresses with small networks. It uses UDP packets. RFC 6763
2. **NTP**: network time protocol, a networking protocol for clock synchronization of systems over packet-switched and variable latency data networks. RFC 5905
3. **OCSP**: online certificate status protocol, an internet protocol that is used for obtaining the revocation status of digital certificates. Firefox uses OCSP to validate HTTPS certificates. RFC 6960
4. **QUIC**: a general protocol for transport layer network protocol. Used by more than half of all connections from Chrome to Google servers. It improves performance of connection-oriented web applications that are using TCP by establishing multiplexed connection between two endpoints using UDP. RFC 9000
5. **ICMP**: Internet control message protocol, a supporting protocol in the suite of Internet protocols. It is used by network devices to send operational information indicating success or failure when communicating with other IP addresses. RFC 792

5b:

1096	62.888043915	172.217.160.174	10.7.63.11	QUIC	1399 Handshake, DCID=e39ca1, SCID=9a143ea19cb4b01c
1097	62.888043979	172.217.160.174	10.7.63.11	QUIC	1399 Handshake, DCID=e39ca1, SCID=9a143ea19cb4b01c
1100	62.888044091	172.217.160.174	10.7.63.11	QUIC	1399 Handshake, DCID=e39ca1, SCID=9a143ea19cb4b01c
1101	62.888044138	172.217.160.174	10.7.63.11	QUIC	1399 Handshake, DCID=e39ca1, SCID=9a143ea19cb4b01c
1102	62.888098903	172.217.160.174	10.7.63.11	QUIC	305 Protected Payload (KP0), DCID=e39ca1
1106	62.891585891	10.7.63.11	172.217.160.174	QUIC	85 Handshake, DCID=9a143ea19cb4b01c, SCID=e39ca1
1110	62.895813538	10.7.63.11	172.217.160.174	QUIC	150 Protected Payload (KP0), DCID=9a143ea19cb4b01c
1111	62.895915381	10.7.63.11	172.217.160.174	QUIC	111 Protected Payload (KP0), DCID=9a143ea19cb4b01c
1112	62.908861836	172.217.160.174	10.7.63.11	QUIC	657 Protected Payload (KP0), DCID=e39ca1
1113	62.909818595	172.217.160.174	10.7.63.11	QUIC	154 Protected Payload (KP0), DCID=e39ca1
1114	62.910222592	10.7.63.11	172.217.160.174	QUIC	73 Protected Payload (KP0), DCID=9a143ea19cb4b01c
1115	62.916885807	10.7.63.11	142.251.42.97	QUIC	1399 Initial, DCID=fce3731ba9290e8e, SCID=613eaf, PKN: 2, PING, PADDING

Frame 1112: 657 bytes on wire (5256 bits), 657 bytes captured (5256 bits) on interface wlp0s20f3, id 0
Ethernet II, Src: Cisco_6c:2d:7f (88:1d:fc:6c:2d:7f), Dst: IntelCor_53:4f:6c (50:e0:85:53:4f:6c)
Internet Protocol Version 4, Src: 172.217.160.174, Dst: 10.7.63.11
User Datagram Protocol, Src Port: 443, Dst Port: 49236
QUIC IETF

The packet number 1115 in the above image, uses QUIC to transfer a packet of data and setup the connection. So $RTT = (62.916885807 - 62.910222592)$

5c:

The image below shows the cookies structure, when visiting ims.iitgn.ac.in.

The screenshot shows a web browser with the URL <https://ims.iitgn.ac.in>. The website displays a welcome message for the Institute Management System (IMS) and provides login options for Employees and Students. The browser's Application tab is open, showing a list of cookies. The cookies are organized into categories: Application, Storage, Cache, and Background Services. The Application category is selected, and a table of cookies is displayed.

Name	Value	Dom...	Path	Expir...	Size	Http...	Secure	Sam...	Same...	Partit...	Pri...
__Secure-3PSIDCC	AEF-XMQ0TWecbSvPqaM2Gf4EF4VC...	.goo...	/	2023...	91	✓	✓	None			High
__Secure-1PSIDCC	AEF-XMRkpwF5suEQkyOEAMvZdm5...	.goo...	/	2023...	92	✓	✓	None			High
SIDCC	AEF-XMQ2W9k6puCtqMVJ-4kp3cvKSX_L...	.goo...	/	2023...	80						High
__Secure-3PAPISID	yYhdUIKf3kG-cyD/AsmyKgnUexvhG6...	.goo...	/	2023...	51		✓	None			High
SAPISID	yYhdUIKf3kG-cyD/AsmyKgnUexvhG6...	.goo...	/	2023...	41		✓				High
APISID	G2Ln4jCpD5HpeSo/Ah9LJsBUjprYashk	.goo...	/	2023...	40						High
__Secure-1PAPISID	yYhdUIKf3kG-cyD/AsmyKgnUexvhG6...	.goo...	/	2023...	51		✓		✓		High
HSID	AyHRYj02KvPysc-3	.goo...	/	2023...	21	✓	✓				High
__Secure-3PSID	NwjrEjXBp9CfZ7d0ldJT11_vlbt4UMks...	.goo...	/	2023...	85	✓	✓	None			High
__Secure-1PSID	NwjrEjXBp9CfZ7d0ldJT11_vlbt4UMks...	.goo...	/	2023...	85	✓	✓		✓		High
SID	NwjrEjXBp9CfZ7d0ldJT11_vlbt4UMks...	.goo...	/	2023...	74						High
SSID	A9tHvrc58xGjtv	.goo...	/	2023...	21	✓	✓				High
1P_JAR	2022-09-16-06	.goo...	/	2022...	19		✓	None			Medi...
NID	511=ZlAqthq7yJyOVNfwzs-uV0uy3IGO...	.goo...	/	2023...	285	✓	✓	None			Medi...
AEC	AakniG0taYwFmV8Z4cyF580lvHNd9...	.goo...	/	2023...	62	✓	✓	Lax			Medi...
_ga	GA1.3.1884294506.1660932641	.iitgn...	/	2023...	30						Medi...
RequestToken	aqcggk25o2ao1gmqmdx1zqb	ims.iit...	/	Sessi...	36	✓		Lax			Medi...

Some cookies observed are:

1. SSID: unique identifier for websites, used to track how a visitor uses a website and monitor performance of marketing campaigns.
2. SIDCC: identification of trusted web traffic.
3. NID: shows google ads in google services for signed-out users.
4. APISID: used by google to display personalized ads on google sites.

The image below shows the cookies when trying to login to ims portal.

The screenshot shows the IIT Gandhinagar IMS Student Portal login page. The page has a dark blue header with the IIT Gandhinagar logo and the text "IMS Student Portal". Below the header is a login form with fields for "Username" and "Password", a "Login" button, and links for "Forgot your password?", "Trouble Logging in? Get Help", and "Not a Student?". The footer of the page says "© All Rights Reserved 2022".

The Chrome DevTools Application tab is open, showing the "Cookies" section for the URL "https://ims.iitgn.ac.in". The table below lists the cookies observed:

Name	Value	Dom...	Path	Expir...	Size	Http...	Secure	Sam...	Same...	Partit...	Pri...
RequestToken	aqc9qk25o2ao1ginqmdxd1zqb	ims.i...	/	Sessi...	36	✓		Lax			Medi...
_ga	GA13.1884294506.1660932641	iitgn...	/	2023...	30						Medi...

Cookies observed are:

1. _ga: Google uses _ga cookie to recognise a unique combination of browser and device