Date:	13/400
CSE421- Computer Networks-SFQ	_ 12.43.9
Lecture 16 - 1Pv4 Functions	- 3
Network layer - Transport segment from sending to receiving	JOST.
seriar encysuales sigments into partiets.	
Network layer protocots in every host trouter. Router examin	08 1400
fields in all IP packets passing through it. On receiving side	Antino
segments to managors layer.	
Functions of Network dayer - (1) forwarding - move packet	
router's 119 to router's appropriate 019	z Gom
2 Standard 91 (11) Problem - 9 And 2 -	
packets from 8 to Duesius mutice also silve determine mute	tatou
packets from 8 to Dueing routing algorithms. Each router was	s Cutries
a routing table which is used to determine the route. (Decision	u makin
Pocket- Quitrlesus > 112-1 - 2 - 25 - 25 - 2	
Packet-Switching + Virtual circuits + Datagram Network	
* Connection + Connectionless Service	(4)
VC Network? Datagram Network	
- similar to transport byer services	1
- service -> Lust to Lost	
- implementation -> network core	
- has no choice -> network provides one or the other	- 1 1 1 1 1
Proceedings of the programme and production of the control of the	
DDP is similar to this.	
* Datagram Networks / (connection(023)	
- No call sotup at network layor	
- No call setup at network layor  - Routers: no state about end-to-end connections	
- No call setup at network layer  - Routers: no state about end-to-end connections  - ro network level connection	
- No call setup at network layor  - Routers: no state about end-to-end connections  - Packets forwarded using Destrip.	
- No call setup at network layor  - Routers: no state about end-to-end connections  - Routers: no state about end-to-end connections  - Packets forwarded using Destrip.  - packets both same s-D pair may take	
- No call setup at network layer  - Routers: no state about end-to-end connections  - Routers: no state about end-to-end connections  - Partets forwarded using Destrip.  - Packets both same s-D pair may take  different paters.	
- No call setup at network layer  - Routers: no state about end-to-end connections  - Routers: no state about end-to-end connections  - Packets forwarded using Destrip.  - Packets forwarded using Destrip.  - packets between some s-D pair may take  different paths.  Advantage-Faster	
- No call setup at network layor  - Routers: no state about end-to-end connections  - Routers: no state about end-to-end connections  - Packets tonoarded using Destrip.  - Packets tonoarded using Destrip.  - packets both same s-D pair may take  - different paths.	

14.5	Date:
Signalli Proto	ol - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
600	- used to setup and maintain teardown VC
CP S	S. S. Satra call + by Xed COMMeCTION
4	& Henry Antrals & ent
	10 ATAL ADMARTSOLALLY XIZS
lacad.	and he today's internet
revib	Datagram rate > Ponsarding (1) Decentralized Switching - routers  de not use of a router - (1) fonoarding - datagram from inc. to out  Datagram rate > Ponsarding (1) Decentralized Switching - routers  de not have connections - time on their
	rate - Quening do not have connections - fine on their
-1-1	1 Internet Netrook dayer own,
N 1397	Routing Protocols IP Protocols ICMP Protocol
2014	- path selection - addressing - emon reporting
DIVISION	- datagram format - souter signall
<b>P</b>	- packet handling
	Pocket-Scitchild of Virtual Networks + paragram Network
	1Pv4 Datagram Format - solved orgholdsonned tugingson
	+Minimum size -> 20 bytes (no data)
	+ maximum size + 65535 bytestragonat attaching
	0~4 bits -> version -> 0100(4) -> 2006064tes
shid	4~8 bits → IHL (Internet Header Longth) - now much of a packet 8~16 bits → TOS > Variable longth is just header.
326	(Flag values) - (1) Precedence -> can assign priority to a specific datagr
3	rate of message (11) Throughput -> 1 (packets will increase)
mar to	delivery over (W) poliability - 1 frage allege modicalated
7	a commu une (1) Pesenved
	L 16×32 bits → TL (Total Lengte) TL= 1HL+ Data
	and promising dies prime what starting
	1st five rouse till Destu. Address -> 32x5 = 20 bytes
	On 8 bits -> TTL (time to live) - a 8-timer; suppose a packet's
- de	about the timer it will destup address Ded (corrupted 11P does not
3000	Leso moving ton R to R exist - it will topp mount in
No.	(infinite coop) the network from R to R so a timer is
	boudwildth waster used. When the time is up, the packet is discarded, Perrouter TTL value drops by 1.

	Date:
Per Map, TTL value is reduced by 1. Packet remains	alive till TTL=0.
Packet always checks the header of the packet for T	TL information.
TTI - A	Hear
TITE O -> Packet amphied	
(Frogramme in 9aul 975) toootocal (TCP/UDP in transport)	70 do 997 Ansbl
16~32 bits -> Header Checksum Lonly checks Ha	is data already check
in transport layer	,
4th row (32 bits) -> Source Address	
5th row (u u) -> Destu Address	
LAMBO - / - (POLL HOUNDON THOO) (SPOR)	
0232 bits - Options field (Extra 40 bytes)	
0x32 bits -> Data	, Valor
to - ray sinsupport to relian et	-3 P W. H. 80
@ 1P Fragmentation and Reassembly -	· pour su hours
MTU-Max Transfer unit 10 whomas loter	To a series of the series of t
- upper limit of bytes an a link betw	A P P P A Pag
- different link; different MTUS	1 100
Suppose one datagram is very large> 45	7001
MTU of one link -> one datagran	OO WYFXS
The design of the second of th	× 1500-10
TOTAL TOTAL	
- GIVICI	ng datagram due
* Reassembled only at final dest	10 -> tragmentati
The Header wed in the state of	A A
* IP Header used to identify and	dorder the frague
* Fragmentation is done from	router-to-router.
B. Wotte = OSM 1200 = 680	
1 Hath- next page 1080 - 1000	nesto prin
all and property of the same o	1 = 0/08H1 F2PDN1
etylines & T still sier tolla inner	07-3 12-10
Ecognison to be sent shirts	

Pragment Offset -> 13 bits

Starting Byte / 8

444045119

1	Date:/
Packet Size = 4500 buttes	ERRY (INTERPORT OF THE CONTROL STADE (R)
= 20(H) + 4480(	
MTU=1500 bytes	
501.0	- tud istal rago an esimos -
Start initial byte = 8 bytes	OLO CD - 91401 Wield
Salvana Alvia	1 = 8/8 = 1
r accorde advist	1480 (D)+30(H)= 15
4480-1480 = 3000	
3000-1480 = 1520	1480 (D) + 20(H) = 15
1520-1480=40	40(D)+20(H)=60
tri redio au tud senage og da	4480 (D)
00	equiq of egass of Nothington
	To start byte = 24
1480 \$ 2959 + 6 1185 + 1	
29604489 370 +	
4440 × 5919 555 +	
Parket Cian - anining	Team of philidollanar teat - paig
= 20101194	
MTU = 16032	
= 15992(0)+	40(H) a share on (M) last packs
es alatook releases alago do e	of to produce levels to the of 10
(1) No. of packets = 2011	01194 = [1256:953]
	992 = 1257 remaluing
(11) Last packet size =	20101194-1256(15992) 129ment
	15242 bytes
last packet size =	15242 + Header = 15242 + 40
A Same and the second of the City	15242 + Header = 15242 + 40 = 15282 bytes
nth packet size excep	
nth packet size excep	= 15282 bytes tlast packet → same size
(11) oth packet -> 0/8	= 15282 bytes tlast packet -> same size = 0 7-14 packet's offset
nth packet size excep	= 15282 bytes that packet -> same size. = 0 7th packet's offset

E ICMP (Internet Courto) Message Particial)  Serror handling, network congestion; availibility of Tennote mosts  - carries no apprilate but status information of network  Hain ICMP (1) Ping  I) Tracerpute  (R)  Feat connectivity  (R)  ** Ping IP of Receiver > Yes IND Response but no other interned  information. No scope to pinpoint cheese the connection failed.  ** Tracerpute IP of Receiver > Returns information per hop. You  can pinpoint inhere the connection failed + find the error and  troubleshoot.  Pring test reachability of a host  ** sends ICMP echo request packets to the target host of worlds for  and ICMP recepouse  ** in this process it measures that time from transmission to reception  (PIT) and records and packet loss  ** shows individual information of each packet. Yes IND depend  on the packet response  ** thous individual information of each packet. Yes IND depend  on the packet response  ** always existence PTT  ** always average PTT  ** atleast one response (out of 4) > ping successful		Date:1.
Serror handling; vertionsk congestion; availibility of remote upsets  - carries no apper data but status information of network  Hain 10MP — (1) Ping  (1) Traceroute  (R)  ** Ping 1P of Receiver > Yeslalo Response but no other internel information. No scope to pinpoint observe the connection failed.  ** Traceroute 1P of Receiver > Roturns information per hop. You  can pinpoint inhere the connection failed + find the error and  troubleshoot.  Ping - test reachability of a host  ** sends 10MP who request packets to the targethost of waits for  an 10MP response  ** in this process it measures the time from transmission to reception  (PTT) and records any packet to see  ** in this process it measures the time from transmission to reception  "(PTT) and records any packet to see  ** in the packet response  on the packet response  hyte size + PTT + TTL  ** in third TTL = 120 and TTL = 114 then noe.  ** almos average PTT  ** atleast one response (out of 4) > ring successful	*	1CMP (Internet Control Message Protocol) -
Tennote mosts  - carries no appr data but status information of metroork  Hoin remp (D) Ping  D) Tracerpute  Receiver PC.  Receiver PC.  * Ping IP of Ecceiver > Jest No Response but no other interned information. No scope to pinpoint observe the connection failed.  * Tracerpute IP of Receiver > Roturns information per mop. You can pinpoint where the connection failed + find the error and trouble shoot.  Ping test reachability of a most *  * sends ICMP scho request packets to the traget host of norits for an ICMP response (4)  * in this process it measures the time from transmission to reception on the packet response but to se hope of the packet response but to se hope on the packet response but size the time from transmission to reception on the packet response but size the time from transmission to reception on the packet response but size the time from transmission to reception of the packet response but size the time for the packet response but size the time was size the time for the packet response but the size the time for the packet response but the size the time for the packet response but the size the time for the packet response but the size the time for the packet response to the packet of		
- carries no apper data but status information of network  Hain ICNIP — (D) Ping  (D) Traceroute  (R)  PC		remote upsts
Hain ICMP - (1) PING  (R) Test connectivity  PC		- carries no appr data but statue information of netrook
(1) Tracespute.  (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)		Main ICMP - a) Ping sotud & stud with make
Ping IP of Pecaver   Period IP of Pecaver   Period IP of Pecaver   Period IP of Pecaver   Period Perfectiver   Period IP of Pecaver   Period Perfectiver   Period IP of Pecaver   Period III of Pecaver   Period III of Pecaver   Period III of III	-	1) Trace pute die mo opinale
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* eliones individual information of each packet. Yes [No dependent on the packet response. byte size + RTT + TTL  * if initial TTL = 120 and TTL = 114 then use. because in the consessed 6 hope.  * choice ping statistics > of loss  * allows average RTT  * at least one response (out of 4) > ping successful	94	+ In the process it measures the time from transmission to reception
* At least one response (out of 4) -> Ding successful	145	(RTT) and records any packet to se?
* At least one response (out of 4) -> Ding successful	1	* shows individual information of each packet. Yes (No depend
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* at least one response (out of 4) -> 0000 successful	1	* If withat TTL=120 and TT1=114 there was
* at least one response (out of 4) -> 0000 successful	1	have crossed & hope total - our today to
* at least one response (out of 4) -> 0000 successful		shows ping statistics -> oto loss
one response (out of 4) -> ping successful	1	+ europe average RTT CICI + of the state of
O 13 Hard successful		* at least one response (out of 4) -> ping successful
and parted size except look parted a source size		and parket size except look perhet & solder

Data ( In)

Date:	 <i>!</i>	<i>I</i>	
Duce.	 		• • • • • • • • • • • • • • • • • • • •

ICMP Messages-	
> type, code and first & bytes of IP datas	man causina emor
c 0~7 bits type	7
st 2 RMI wite codo	
16m31 chocksum	
end & 0~81 message	Bio.
70W ( V 31 1123249C	
Type Code. Message	
o o echo reply (ping)	R→ S
8 0 v req (u)	8 → R
haring ITT 0 11	- All to a line of the line of
me S 3 1 Destu host unreach	iahle.
= 1 3 3 u port u	
Traceroute - tool used to trace pater from S -> D	Lingh
* shows IP address + domain name of each on	wiler land and
the client.	wite I not INTIM
* if there is an error I no response -	
* * Request timed out.	
packet could not finish sendingly	2000/-00
* Source sends sories of UDP segments to destu.	S S
* with datagram arrives to with mutor-	
(1) router discarde datagram	
(1) sends ICMP message to source	
> Englisher manie	alamentara LIA AA
Govanival, sour	of muter + 1P add
→ turee times	ce cavada vy PII
* stop > UDP segment eventually reached	oc docth i
Destu returns ICMP port unrea	chalole scales
4 source gets this	Massa packer
TIME ALL TANKS	