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Implement a client, server communication using socket programming.

```
/* Server */
#include <sys/type.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <sys/stat.h>
#include <stdlib.h>
#include <unistd.h>
#include <string.h>
#include <fcntl.h>
#include <arpa/inet.h>
int main (int argc, char * argv[])
{
    int conf, create_socket, new_socket, addrlen;
    int bufsize = 1024; char * buffer = malloc(bufsize);
    char fname[256]; struct sockaddr_in address;
    if ((create_socket = socket(AF_INET, SOCK_STREAM, 0)) > 0)
        printf("The socket was created\n");
    else { printf("Socket creation failed\n"); exit(0); }
    inet_pton(AF_INET, (argv[1]), &address.sin_addr);
    address.sin_port = htons(atoi(argv[2]));
    if (bind(create_socket, (struct sockaddr *)&address,
        sizeof(address)) == 0)
        printf("Binding Socket to IP: %s\n"
            inet_ntoa(address.sin_addr));
    else
    { printf("Bind failed\n"); exit(0); }
```

Products

Signature

```
listen (create_socket, 3);
addrlen = sizeof (struct sockaddr_in);
new_socket = accept (create_socket (struct
sockaddr_in *)& address, &addrlen);
if (new_socket > 0)
  printf("The client %s is connected \n",
                inet_ntoa (address.sin_addr));
else
  exit(0);
recv (new_socket, fname, 255, 0);
printf ("A request from filename %s received \n", fname);
if ((fd = open (fname, O_RDONLY)) < 0)
  { perror ("File open failed"); exit(0); }
while ((cnt = read(fd, buffer, bufsize)) > 0)
{
  printf (" Reading the file contents \n Sending the content to
  send (new_socket, buffer, cnt, 0);      client \n");
  printf (" Request Completed ");
  close (new_socket); return close(create_socket);}
```

```
/* Client */
#include <sys/socket.h>
#include <sys/types.h>
#include <netinet/in.h>
#include <unistd.h>
```

```
#include <stdlib.h>
#include <stdio.h>
#include <arpa/inet.h>
int main(int argc, char *argv[])
{int cn_socket, bufsize=1024, cont;
 char *buf = malloc(bufsize) fname[25]. struct sockaddr_in
 if(cn_socket=socket(AF_INET, SOCK_STREAM,0))>0)' address;
    printf("Socket created\n");
 else exit(0);
 address.sin_family = AF_INET;
 address.sin_port= htons(1500);
 inet_pton(AF_INET, argv[1], &address.sin_addr);
 if(connect(cn_sock,(struct sockaddr *)&address,
                                    sizeof(address))==0)
 printf("The connection was accepted with the server %s\n",
                                                argv[1]);
 else exit(0);
 printf("Enter the filename to request:");
 scanf("%s",&fname); send(cn_sock, fname, sizeof(fname),0);
 printf("Request accepted by the server --- waiting to
  receive contents of file\n\n");
 printf("Result obtained, the content of file are...\n\n");
 while(cont=recv(cn_sock, buffer, bufsize, 0))>0)
    write(1, buffer, cont);
 printf("\n\nEOF");
 return close(cn_sock);}
```

Products

Signature: _____

Output:

Server

./server 0.0.0.0 [5001]

The socket was created

Binding socket to IP 0.0.0.0

The client 127.0.0.1 is connected

A request for filename test.txt received

Reading file content

Sending contents to client

Request completed

./client 0.0.0.0

socket created

The connection was created with the server 0.0.0.0

Enter the requested file : test.txt

Request obtained by server, waiting to receive content of file

Result obtained ; the contents of file are..

Hello

Excuting the first program

EOF

Ex-②

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Implement distance vector routing for a simple topology of routers.

```
#include <stdio.h>
struct node {
    unsigned dist[20]; unsigned from[20]; } rt[10];
int main() {
    int costmat[20][20], nodes, i, j, k, count=0;
    printf("Enter no of nodes "); scanf("%d",&nodes);
    printf("Enter the cost matrix:\n");
    for(i=0; i<nodes; i++) { for(j=0; j<nodes; j++) {
        scanf("%d", &costmat[i][j]);
        rt[i].dist[j] = costmat[i][j]; rt[i].from[j]=j; } }

    do { count=0; for(i=0; i<nodes; i++)
        for(j=0; j<nodes; j++) for(k=0; k<nodes; k++)
            if(rt[i].dist[j] > costmat[i][k] + rt[k].dist[j]) {
                rt[i].dist[j] = rt[i].dist[k] + rt[k].dist[j];
                rt[i].from[j] = k; count++; } } while(count!=0);

    for(i=0; i<nodes; i++) {
        printf("\n\n for router %d\n", i+1);
        for(j=0; j<nodes; j++) {
            printf("\n node %d via %d distance %d", j+1,
                rt[i].from[j]+1, rt[i].dist[j]); } }
    printf("\n\n"); }
```

Output:

Enter the number of nodes: 4

Enter the cost matrix

0	1	5	999
1	0	3	999
5	3	0	4
999	999	4	0

For router 1

Node 1 via 1 distance 0
Node 2 via 2 distance 1
Node 3 via 2 distance 4
Node 4 via 3 distance 8

For router 2

Node 1 via 1 distance 1
Node 2 via 2 distance 0
Node 3 via 3 distance 3
Node 4 via 3 distance 7

For router 3

Node 1 via 2 distance 4
Node 2 via 2 distance 3
Node 3 via 3 distance 0
Node 4 via 4 distance 4

For router 4

Node 1 via 3 distance 8
Node 2 via 3 distance 7
Node 3 via 3 distance 4
Node 4 via 4 distance 0

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Write a program for error detection & correction checksum & Hamming code

/* Hamming Code */

```
#include <stdio.h>
void main(){
    int data[10], datan[6], c, c1, c2, c3, i;
    printf("senden: ");
    scanf("%d %d %d %d", &data[0], &data[1], &data[2], &data[4]);
    data[6] = data[0] ^ data[2] ^ data[4];
    data[5] = data[0] ^ data[1] ^ data[4];
    data[3] = data[0] ^ data[1] ^ data[2];
    printf("Encoded data: ");
    for(i=0; i<7; i++) printf("%d", data[i]);
    printf("Receiven: ");
    for(i=0; i<7; i++) scanf("%d", &datan[i]);
    c1 = datan[6] ^ datan[4] ^ datan[2] ^ datan[0];
    c2 = datan[5] ^ datan[4] ^ datan[1] ^ datan[0];
    c3 = datan[3] ^ datan[2] ^ datan[1] ^ datan[0];
    c = c3*2*2 + c2*2 + c1;
    printf("\n Syndrome bits: %d%d%d", c1, c2, c3);
    if(c==0) { printf("\n No error while transmission\n");
    else { printf("error position %d", c);
        printf("Data sent:");
        for(i=0; i<7; i++) printf("%d", data[i]);
    printf("Data received");
```

Products

Signature

```
for (i=0; i<7; i++)
        printf("%d", datan[i]);
printf("\n Corrent message is:");
if (datan[7-c]==0) data[7-c]=1;
  else
      datan[7-c]=0;
for (i=0; i<7; i++) printf("%d", datan[i]);
}
}
```

Output:

Sender: 1011
Encoded data: 1010101
Receiver: 1110101
Syndrome bits: 011
Error position: 6
Data sent: 1010101
Data received: 1110101
Correct message: 1010101.

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Implement a simple multicast routing mechanism

```
/* Sender */
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <time.h>
#include <string.h>
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
#define HELLO_PORT 12345
#define HELLO_GROUP "225.0.0.37"
int main(int argc, char *argv[]){
  struct sockaddr_in addr;
  int fd, cnt; char *msg; struct ip_mreq mreq;
  if(argc ==1) { msg = "RVCE-CSE"; }
  else msg = argv[1];
  if ((fd = socket(AF_INET, SOCK_DGRAM, 0)<0)
  { perror("Opening datagram socket error");
    exit(1); }
  else { printf("Opening datagram socket --- OK\n"); }
  memset(&addr, 0, sizeof(addr));
  addr.sin_family = AF_INET;
  addr.sin_port = htons(HELLO_PORT);
```

```
addr.sin_addr.s_addr = (inet_addr(HELLO_GROUP));
addr.sin while(1){
  if (sendto(fd, msg, strlen(msg), 0, (struct sockaddr*)
      &addr, sizeof(addr)) < 0) {
  printf(" Sending datagram message error "); exit(1); }
  else { printf(" Sending datagram message ... OK \n");
  sleep(2); }
    return 0; }

/* Client */
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <time.h>
#include <string.h>
#include <stdio.h>
#define HELLO_PORT 12345
#define HELLO_GROUP "225.0.0.37"
int main(int argc, char *argv[]) {
  struct sockaddr_in addr;
  int fd, nbytes, addrlen, ml;
  struct ip_mreq mreq;
  char msg[24];
  if ((fd = socket(AF_INET, SOCK_DGRAM, 0)) < 0){
```

```
perror("Opening datagram socket error");
    exit(1);}
else printf("Opening datagram --- OK");
if(setsockopt(fd,SOL_SOCKET,SO_REUSEADDR,&yes,
                sizeof(yes))<0),
    {perror("Receiving ADDR failed"); exit(1);}
else printf("Reusing ADDR -- OK");
bzero(&addr, sizeof(addr));
addr.sin_family=AF_INET;
addr.sin_addr.s_addr=htonl(INADDR_ANY);
addr.sin_port=htons(HELLO_PORT);
if(bind(fd,(struct sockaddr*)&addr,sizeof(addr))<0)
    {perror("Bind"); exit(1);}
else printf("Binding datagram socket... OK\n");
mreq.imr_multiaddr.s_addr=inet_addr(HELLO_GROUP);
mreq.imr_interface.s_addr=htonl(INADDR_ANY);
if(setsockopt(fd,IPPROTO_IP,IP_ADD_MEMBERSHIP,
        (char*)&mreq,sizeof(mreq))<0){
perror("Adding multicast group error")); exit(1);}
else printf("Adding multicast group...OK\n");
ml=sizeof(msg);
while(1){
    if(nbytes=recvfrom(fd,msg,sizeof(msg),0,NULL,
            NULL))<0){perror("Reading error"); exit(0);}
printf("The message from multicast server is
                "%s.\n",msg);
```

Signature

Output:

./sender
Opening the datagram socket... OK
Sending datagram message ... OK
Sending datagram message ... OK
Sending datagram message ... OK
:

./listener // listener 1
Opening datagram socket ... OK
Receiving ADDR ... OK
Binding datagram socket ... OK
Adding multicast group ... OK
The message from multicast server is : RVCE_CSE
The message from multicast server is : RVCE_CSE
:

./listener // listen 2
Opening ~~data~~ datagram socket ... OK
Receiving ADDR ... OK
Binding datagram socket ... OK
Adding multicast group ... OK
The message from multicast server is : RVCE-CSE
The message from multicast server is : RVCE_CSE
:

Ex ⑤

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Implement concurrent chat server that allows current logged in users to chat.

```
/* server */
#include <sys/types.h>
#include <sys/socket.h>
#include <sys/stat.h>
#include <unistd.h>
#include <stdlib.h>
#include <fcntl.h>
#include <stdio.h>
#include <arpa/inet.h>
#include <string.h>
#define max 255
void str_echo (int connfd)
{
  int n; char *buf = malloc (max);
  while (n=read(connfd, buf, max, 0))>0)
    { fputs ("From client: ", stdout);
      fputs (buf, stdout); fputs ("\n", stdout);
      if (fgets (buf, max, stdin) != NULL) {
        send(connfd, buf, strlen (buf), 0); }
      bzero (buf, max); }
int main ()
{
  int cont, listfd, connfd, addrlen addrlen2, fd, pid,
  struct sockaddr_in addr, cli_addr; addrlen3;
  if (listfd = socket (AF_INET, SOCK_STREAM, 0))>0)
```

Products

Signature

```
printf("The socket was created");
addr.sin_family = AF_INET;
addr.sin_addr.s_addr = INADDR_ANY;
addr.sin_port = htons(16001);
printf("The address before bind %s ... \n", inet_ntoa
                                    (addr.sin_addr));
if(bind(listfd, (struct sockaddr*)&addr, sizeof(addr))
                                    == 0)
    printf("Binding started \n");
    printf("The address after bind %s ... \n", inet_ntoa
    listen(listfd, 3);                (addr.sin_addr));
    printf("Server is listening \n");
    getsockname(listfd, (struct sockaddr) &addr,
                                    &addrlen);
printf("The server's local address %s and port
%d \n", inet_ntoa(addr.sin_addr), htons(addr.sin_port));
for(;;){
    addrlen = sizeof(struct sockaddr_in);
    connfd = accept(listfd, (struct sockaddr*) &cliaddr,
    addrlen2 = sizeof(struct sockaddr_in); &addrlen);
int i = getpeername(connfd, (struct sockaddr*)
                    &cli_addr, &addrlen);
printf("The client %s is connected on
port %d \n", inet_ntoa(cli_addr.sin_addr),
                    htons(cli_addr.sin_port));
if((pid = fork()) == 0){
    printf("Inside child \n"); close(listfd);
```

```
str_echo(connfd); exit(0); }
close(connfd); } return 0; }

/* client */
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <unistd.h>
#include <stdio.h>
#include <string.h>
#include <arpa/inet.h>
#define max 255

void str_cli(FILE *fp, int sockfd) {
    int cont, char *buf = malloc(max);
    fputs("To server: ", stdout);
    while (fgets(buf, max, fp) != NULL) {
        send(sockfd, buf, strlen(buf), 0);
    if ((cont = recv(sockfd, buf, max, 0)) > 0) {
        fputs("From server: ", stdout); fputs(buf, stdout);
        if (strcmp(buf, "exit") == 0) {
            printf("Client exit..."); break; }
        bzero(buf, 1024); } fputs("To server: ", stdout); }
        printf("\nEOF\n"); }
```

```
int main (int argc, char *argv[])
{
    int cn_sock; struct sockaddr_in addr;
    if((cn_sock = socket(AF_INET, SOCK_STREAM, 0))>0)
        printf("Socket was created successfully");
    addr.sin_family = AF_INET;
    addr.sin_port = htons(16001);
    inet_pton(AF_INET, argv[1], &addr.sin_addr);
    if(connect(cn_sock, (struct sockaddr*) &addr,
                sizeof(addr)) == 0)
        printf("The connection was accepted with the
                server %s ... \n", argv[1]);
    else printf("Error in connect \n");
    stdcli(stdin, cn_sock);
    return close(cn_sock); }
```

Output:

./server
The socket was created
The address before bind 0.0.0.0
Binding socket
The address after bind 0.0.0.0
Server is listening
The server is local address 0.0.0.0 port 1600
The client 127.0.0.1 is connected on port 43136
Inside child
The client 127.0.0.1 is connected on port 43138
Inside child
From client: Client1
From client: client2
Hii cl1
Hii cl2
From client: sup
exit
From client: Hi server
exit client 2

./client 127.0.0.1
The socket was created
The connection was accepted with server 127.0.0.1
To server: Client1
From server: Hii cl1
To server: sup
From server: exit.

Ex 6-1

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Implement both concurrent, iterative echo servers using TCP, UDP.

```
/* TCP concurrent Server */

#include <sys/types.h>
#include <sys/socket.h>
#include <sys/stat.h>
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <fcntl.h>
#include <arpa/inet.h>

void str_echo(int connfd){
    int n, bufsize=1024; char *buf=malloc(bufsize);
again: while((n=recv(connfd, buf, bufsize, 0))>0)
        send((connfd, buf, n, 0);
    if(n<0) goto again; free(buf);}

int main(){
    int listfd, connfd, addrlen, pid, addrlen;
    struct sockaddr_in addr, cli_addr;
    if((listfd=socket(AF_INET, SOCK_STREAM, 0))>0)
        printf("The socket was created\n");
```

```
addr.sin_family = AF_INET, addr.sin_addr.s_addr
addr.sin_port = htons(1500);  = INADDR_ANY;
printf("The address before bind %s...\n",
                    inet_ntoa(addr.sin_addr));
if (bind(listfd, (struct sockaddr *) &addr, sizeof
printf("Binding socket");    (addr)) == 0)
printf("The address after bind %s...\n",
                    inet_ntoa(addr.sin_addr));
listen(listfd, 3);
printf("Server is listening");
getsockname(listfd, (struct sockaddr *)&addr,
                    &addrlen3);
printf("The server's local address %s ... and
    port %d \n", inet_ntoa(addr.sin_addr,
                    htons(addr.sin_port));
for(;;) { addrlen = sizeof(struct sockaddr_in);
    connfd = accept(listfd, (struct sockaddr *) &cli.
                    &addrlen); addr,
int; = getpeername(connfd, (struct sockaddr *) &cli_addr,
if(connfd >0) {                    &addrlen);
    printf("The client %s is connect on port %d \n",
    inet_ntoa(cli_addr.sin_addr),
                    htons(cli_addr.sin_port));}
if((pid = fork()) == 0) {printf("Inside child");
    close(listfd); str_echo(connfd); exit(0);}
    close(connfd); } return 0; }
```

/* client */

```
#include <sys/socket.h>
#include <sys/types.h>
#include <netinet/in.h>
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <arpa/inet.h>
#include <string.h>

void ~~strtag~~ str_cli(FILE *fp, int sockfd){
    int bs=624; char *buf=malloc(sizeof(bs);
    while(fgets(buf, bs, fp)!=NULL){
    if(strcmp(buf,"exit")==0){
            printf("client exit..\n"); break;}
    send(sockfd, buf, sizeof(buf),0);
     if(recv(sockfd, buf, bs, 0)>0)
        fputs(buf, stdout);}
        printf("\n EOF\n"); free(buf);}

int main(int argc, char *argv[]){
    int cn_sock; struct sockaddr_in addrs;
 if((cn_sock=socket(AF_INET, SOCK_STREAM, 0))<0)
        printf("The socket was created\n");
    addrs.sin_family=AF_INET
    addrs.sin_port=htons(6001);
```

```
inet_pton (AF_INET, argv [1], &addr.sin_addr);
if (connect (cn_sock, (struct sockaddr *) &addr,
            sizeof (addr)) == 0)
printf ("The connection was accepted with the
        server %s ... \n", argv [1]);
else { printf ("Error in connect \n");
   exit (0); }
str_cli (stdin, cn_sock);
return (cn_sock);
}
```

Products

Signature : .....

Output

. /server
The socket was created
The address before bind is 0.0.0.0
Binding socket
The address after bind is 0.0.0.0
Server is listening.
The server's local address 0.0.0.0 and port 15001
The client 127.0.0.1 is connected on port 54742
Inside child
The client 127.0.0.1 is connected on port 54744
Inside child

. /client 0.0.0.0
The socket was created
The connection was accepted with the server 0.0.0.0
Hello
Hello
client1 executing
client1 executing
exit
client exit
EOF

Ex. 6.2

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```
/* TCP iterative */
/* server */
#include <sys/types.h>
#include <netinet.h>
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <sys/socket.h>
#include <fcntl.h>
#include <arpa/inet.h>

void str_echo (connfd){
    int n, bs = 1024; char *buf = malloc (bs);
again: while ((n= recv (connfd, buf, bs, 0)) >0) {
            send (connfd, buf, n, 0); }
        if (n<0) goto again; }

int main (){
    int cont, lfd, cfd, cadlen, addr2, cadlen3, fd, pid;
    struct sockaddr_in addr, cad;
    if ( lfd = socket (AF_INET, SOCK_STREAM, 0)) >0)
        printf ("socket created");
    addr.sin_family = AF_INET; addr.sin_addr.s_addr
    addr.sin_port = htons (1500).          = INADDR_ANY;
    if (bind (lfd, (struct sockaddr *)&addr, sizeof (addr)) ==0)
        printf ("Binding Socket");
```

Products

Signature :

```
else printf("Bind failed"); listen(lfd, 3);
printf("Server is listening");
for(;;) { caddrsz = sizeof(struct sockaddr_in);
cfd = accept(cfd, (struct sockaddr *) &cliaddr, &caddrsz);
printf("The %s is connected on port %d",
        inet_ntoa(cliaddr.sin_addr), htons(cliaddr.sin_port));
str_echo(cfd); close(cfd); }
return 0; }

/* client */
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet.h>
#include <unistd.h>
#include <arpa/inet.h>

void str_cli(FILE *fp, int sockfd){
int bs = 1024, cont; char *buf = malloc(bs);
while(fgets(buf, bs, fp) != NULL){
        if((strcmp(buf, "exit")) == 0){
                printf("Client exit\n"); exit(0); }
send(sockfd, buf, sizeof(buf), 0);
if((cont = recv(sockfd, buf, bs, 0)) > 0){
                fputs(buf, stdout); }}}
```

Products

Signature : .....

```
// int main (int argc, char* argv[])
{
    int cn_sock; struct sockaddr_in addr;
    if ((cn_sock = socket(AF_INET, SOCK_STREAM, 0)) >= 0)
        printf("The socket was created");
    addr.sin_family = AF_INET;
    addr.sin_port = htons(1500);
    inet_pton(AF_INET, argv[1], &addr.sin_addr);
    if (connect(cn_sock, (struct sockaddr *)&addr,
        sizeof(addr)) == 0)
            printf("The client is connecting to the
server %s \n", argv[1]);
    else { printf("Error in connection"); exit(0); }
    str_cli(stdin, cn_sockat);
    return close(cn_sock); }
```

Output

./server
The socket was created
Binding socket
Server is listening
The client 127.0.0.1 is connected on port 54732
The client 127.0.0.1 is connected on port 54734

./client 0.0.0.0
The client is connecting to the server 0.0.0.0
Hello
Hello
TCP iterative
TCP iterative
client1
client1
Client exist...
EOF

./client 0.0.0.0
The socket was created
The client is connecting to the server 0.0.0.0
client 2
client 2
Executing
Executing
:

```
/* UDP iterative - server */

#include <sysTypes.h>
#include<sys/socket.h>
#include<sys/stat.h>
#include<netinet.h>
#include<stdlib.h>
#include<stdio.h>
#include<unpa/inet.h>

Void str_echo(int sockfd, struct sockaddr *cliad, int len){
    int n, bs=1024; char *buff=malloc(bs);
    int addrlen;
for(;;){ addrlen=len; n=recvfrom(sockfd, buffbs, 0, cliad,
sendto(sockfd, buff, 0, cliad, addrlen);          &addrlen);

int main(){
    int sockfd; struct sockaddr_in saddr, caddr;
if((sockfd=socket(AF_INET, SOCK_DGRAM,0)>0)
    print("The socket was created");
    saddr.sin_family = AF_INET
    saddr.sin_addr.s_addr = INADDR_ANY;
    saddr.sin_port=htons(1600);
if(bind(sockfd(struct sockaddr*)&saddr, sizeof(addr))
    printf("Binding socket");          ==20)
str_echo(sockfd,(struct sockaddr*)&saddr, sizeof(caddr));
```

Products

Signature : .....

```
return 0; }

/*client*/
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <string.h>
void dg_cli (FILE *fp, int sockfd, const struct
        sockaddr * psaddr, int len){
  int n; char sendline[1024], recvline[1024];
  while (fgets (sendline, 1024, fp) != NULL){
    sendto (sockfd, sendline, strlen (sendline), 0,
                psaddr, len);
    if (strcmp (sendline, "exit")==0){
        printf ("client exit"); break; }
    n=recvfrom (sockfd, recvline, 1024, NULL, NULL);
    recvline[n]='\0'; fputs (recvline, stdout);
  }}

int main (int argc, char * argv[]){
  int sockfd; struct sockaddr_in sadd;
  if ((sockfd = socket (AF_INET, SOCK_DGRAM,0))>0)
        printf (" Socket created ");
  else printf (" Error in creating socket");
```

```
sadd.sin_family = AF_INET;
sadd.sin_port = htons(1600);
inet_pton(AF_INET, argv[1], &sadd.sin_addr);
cg_cli(stdin, sockfd, (struct sockaddr *)&sadd,
                    sizeof(sad));
exit(0);
```

Output :-

```
./server
The socket was created
Bind to socket
./client 0.0.0.0   //client 1
socket created
Hello
Hello
UDP
UDP
exit
Client exit
./client 0.0.0.0 -- //client 2
socket created
Hi
Hi
Executing
Executing
Exit
Client Exit.
```

Ex: 7

Date
Page

Implement remote command execution using socket system calls.

```
/* server */
#include <sys/types.h>
#include <sys/stat.h>
#include <sys/socket.h>
#include <string.h>
#include <stdlib.h>
#include <stdio.h>
int main(){
    int sd, acpt, len, bytes, port; char send[50],
    recv[50]; struct sockaddr_in serv, cli;
    if((sd = socket(AF_INET, SOCK_STREAM, 0))<0)
        { perror("Error in socket"); exit(0);}
    else printf("Socket created successfully \n");
    bzero(&serv, sizeof(serv)); serv.sin_family=AF_INET;
    serv.sin_port= htons(8080);
    serv.sin_addr.s_addr= htonl(INADDR_ANY);
    if(bind(sd, (struct sockaddr *)&serv, sizeof(serv))<0)
        {printf("Error in bind"); exit(0);}
    else printf("Binding socket to %s \n",
    if(listen(inet_ntoa(serv.sin_addr)),
        if(listen(sd<3)<0) {printf("Error listen"); exit(0);
        else printf("Server listening");
```

Products

Signature :

```
if((acpt=accept(sd,(struct sockaddr*)NULL,NULL))<0)
    {printf("Error in accept");exit(0);}
else printf("Client connected");
while(1){bytes=recv(acpt,recv,50,0);
        recv[bytes]='\0';
    if(strcmp(recv,"end")==0){close(acpt);
    else{                                exit(0);}
    printf("Command received %s",recv);
    system(recv);printf("\n");}}
```

```
/* Client */
#include<stdio.h>
#include<stdlib.h
#include<arpa/inet.h>
#include<sys/types.h>
#include<sys/socket.h>
#include<errno.h>
int main(){
    int sd,acpt,len,bytes,port;char send[50],new[50];
    struct sockaddr_in serv,cli;
    if((sd=socket(AF_INET,SOCK_STREAM,0))<0){
        perror("Error in socket");exit(0);}
        printf("Socket created successfully");
    bzero(serv,sizeof(serv));serv.sin_family=AF_INET;
    serv.sin_port=htons(8080);
    serv.sin_addr.s_addr=htonl(INADDR_ANY);
```

```
if (connect (sd, (struct sockaddr *) &serv,
                    sizeof(serv)) < 0) {
  printf ("Error in connection \n"); exit(0); }
else printf("Connection established with the server \n");
while(1) { printf("Enter the command: ");
  gets(send);
  if (strcmp(send, "end") != 0)
      send (sd, send, 50, 0);
  else {send (sd, send, 50, 0);
      close(sd);
      break; } }
```

Outputs

./client
Socket created Successfully
Connection established with server
Enter command: date
Enter command: ls
Enter command: rm dummy.txt
Enter command: ls
Enter command: end

./sender
Socket created successfully
Binding socket to IP: 0.0.0.0
Server listening
Wed Dec 16 19:17:00 IST 2020
client connected
Command received date.
a.out client.c dummy.txt server.c
command received: ls
command received: rm dummy.txt
a.out client.c server.c
command received: ls

Ex. 8

Date
Page

Write a program to encrypt and decrypt data using RSA & exchange the key securely using Diffie-Hellman Key exchange method.

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <string.h>

long int gcd(long int a, long int b){
    if(a==0) return b;
    if(b==0) return a;
    return gcd(b, a%b);}

long int isprime(long int a){
    int i; for(i=2;i<a;i++){if(a%i==0)return 0;}
    return 1;}

long int encrypt(long int ch, long int n, long int e){
    long int i, temp=ch; for(i=0;i<e;i++)
    temp = (temp*ch)%n;
    return temp;}

long decrypt(long int ch, long int n, long int d){
    long int i; temp ch; for(i=1;i<d;i++)
    temp = temp*ch)%n; return temp;}
```

```
int main() {
    long int i, p, q, len, e, d, n, phi, cipher[50];
    char text[50];
    printf("Enter text to be encrypted ");
    scanf("%s", text);
    len = strlen(text);
    do { p = rand() % 30; } while (!isprime(p));
    do { q = rand() % 30; } while (!isprime(q));
    n = p*q; phi = (p-1)*(q-1);
    do { d = rand() % phi; } while ((d*e) % phi != 1);
    printf("Two prime no p & q are %d and %d \n", p, q);
    printf("n (p*q) = %d * %d = %d", p, q, p*q);
    printf("(p-1)*(q-1) = %d \n", phi);
    printf("public key (n,e) : (%d, %d) \n", n, e);
    printf("Private Key (n,d) : (%d, %d) \n", n, d);
    for (i = 0; i < len; i++)
        cipher[i] = encrypt(text[i], n, e);
    printf("Encrypted message : \n");
    for (i = 0; i < len; i++) printf("%d", cipher[i]);
    for (i = 0; i < len; i++)
        text[i] = decrypt(cipher[i], n, d);
        printf("\n");
    printf("decrypted message :");
        for (i = 0; i < len; i++) printf("%c", text[i]);
            printf("\n"); return 0; }
```

Output:

Enter the text to be encrypted: Hello
Two prime numbers (p and q) are 13 and 23
n (p * q) = 13 * 23 = 299
(p-1) * (q-1) = 264
Public Key (n, e) = (299, 103)
private Key (n, d) = (299 223)
Encrypted message = 58757471477227
Decrypted message: Hello

Ex-8-

Date
Page

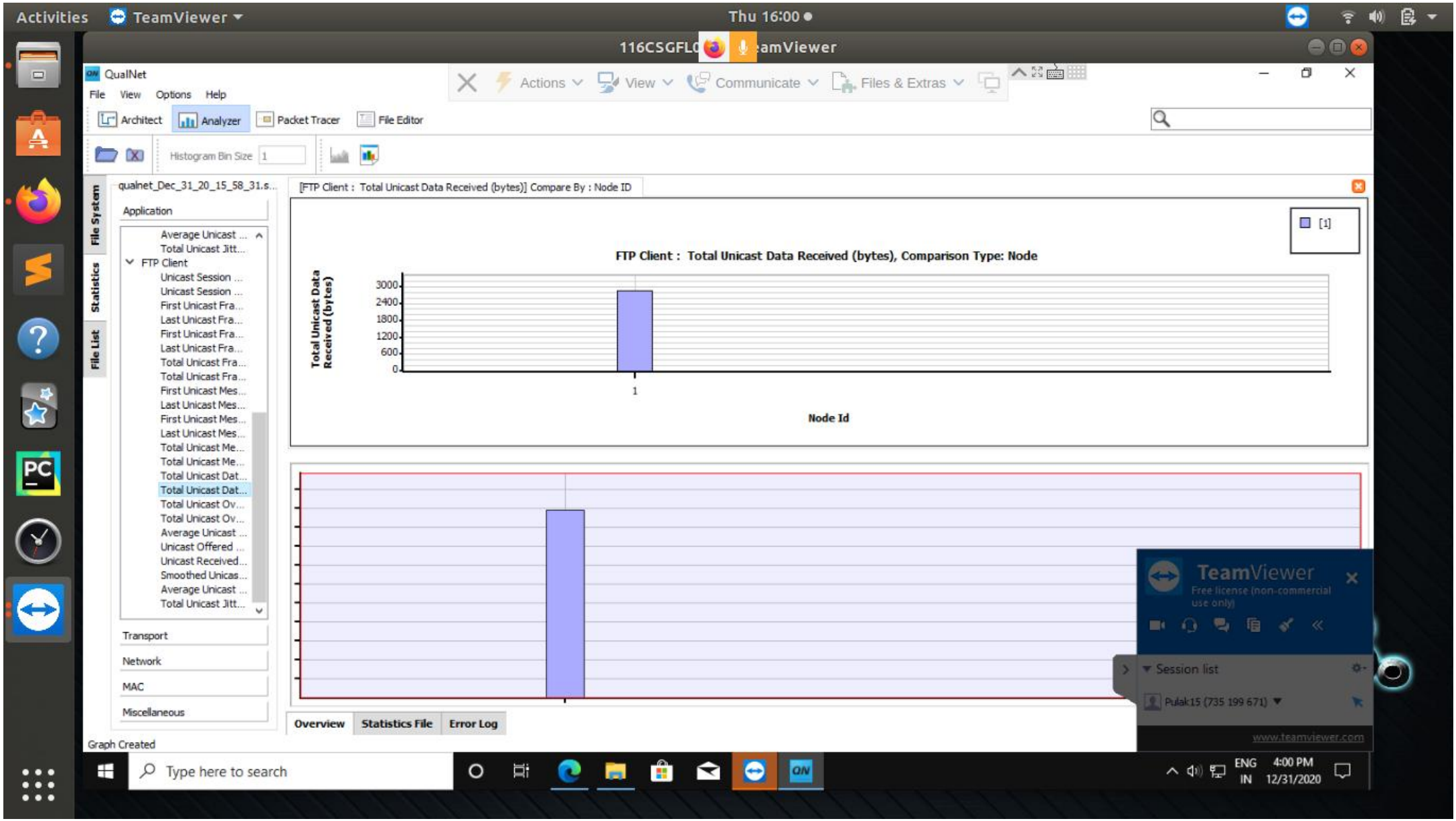
/* Diffie-Hellman Key exchange algorithm */

```
#include <stdio.h>
#include <math.h>
long int power (long int a, long int b, long int P)
    if (b==1) return a;
    else return (((long int) pow(a,b))%P);

int main ()
{
    long int P, G, x, a, b, y, Ka, Kb;
    P=23, G=9;
    printf ("The value of P: %d \n The value of G: %d \n", P, G);
    a=4, b=3;
    printf ("The private key for alice : %d \n The private key for Bob : %d \n", a, b);
    x = power (G, a, P);
    y = power (G, b, P);
    Ka = power (y, a, P);
    Kb = power (x, b, P);
    printf ("The Secret Key for Alice's : %d \n The secret key for Bob : %d \n", Ka, Kb);
    return 0;
}
```

Output:

```
The value of p: 23
The value of G: 9
The private Key a for Alice: 4
The private Key b for bob: 3
Secret Key for Alice: 9
Secret Key for Bob: 9
```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First Unicast Mes...
Last Unicast Mes...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Me...
Total Unicast Dat...
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3000
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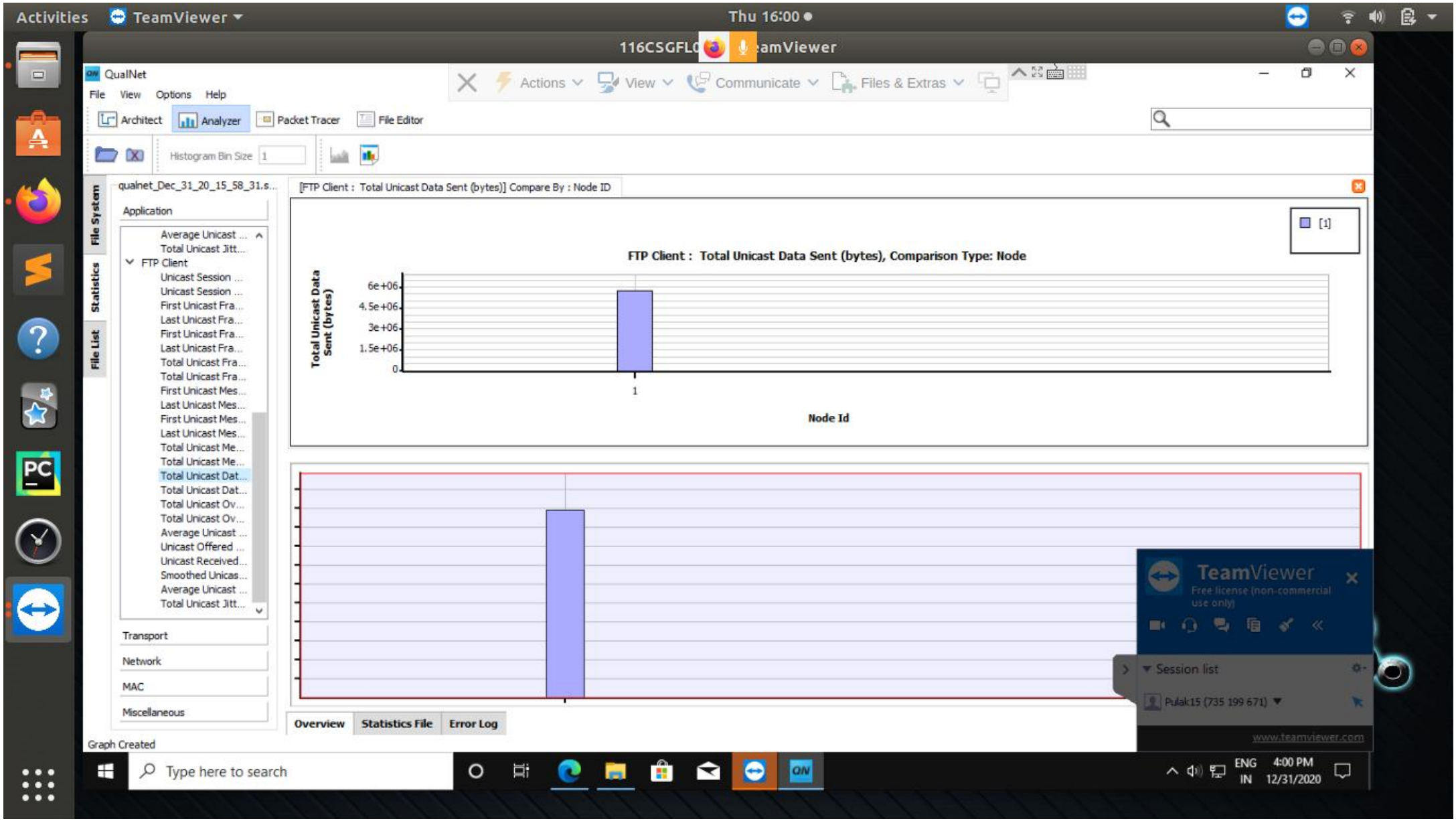
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4.5e+06
3e+06
1.5e+06
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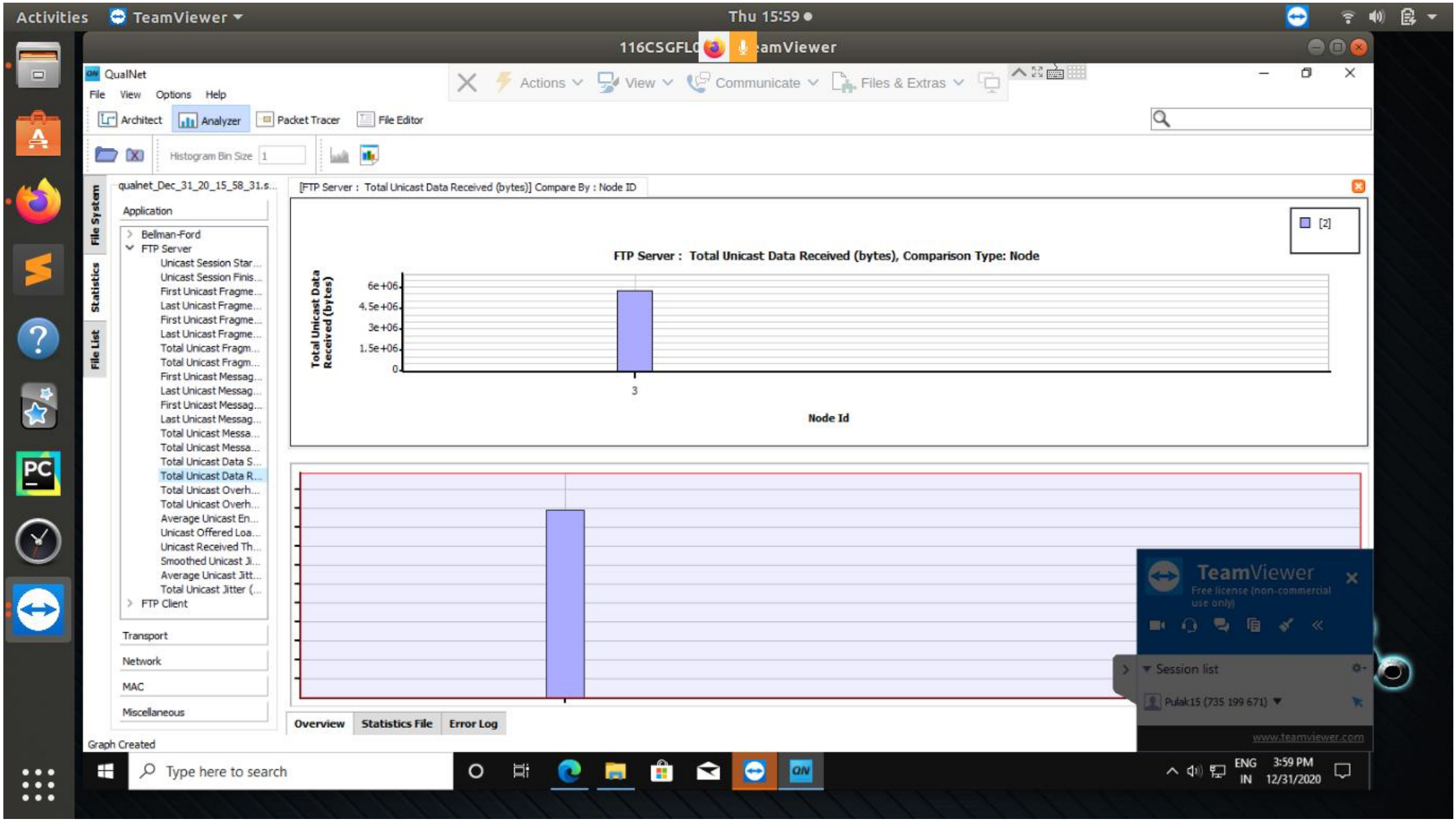
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4.5e+06
3e+06
1.5e+06
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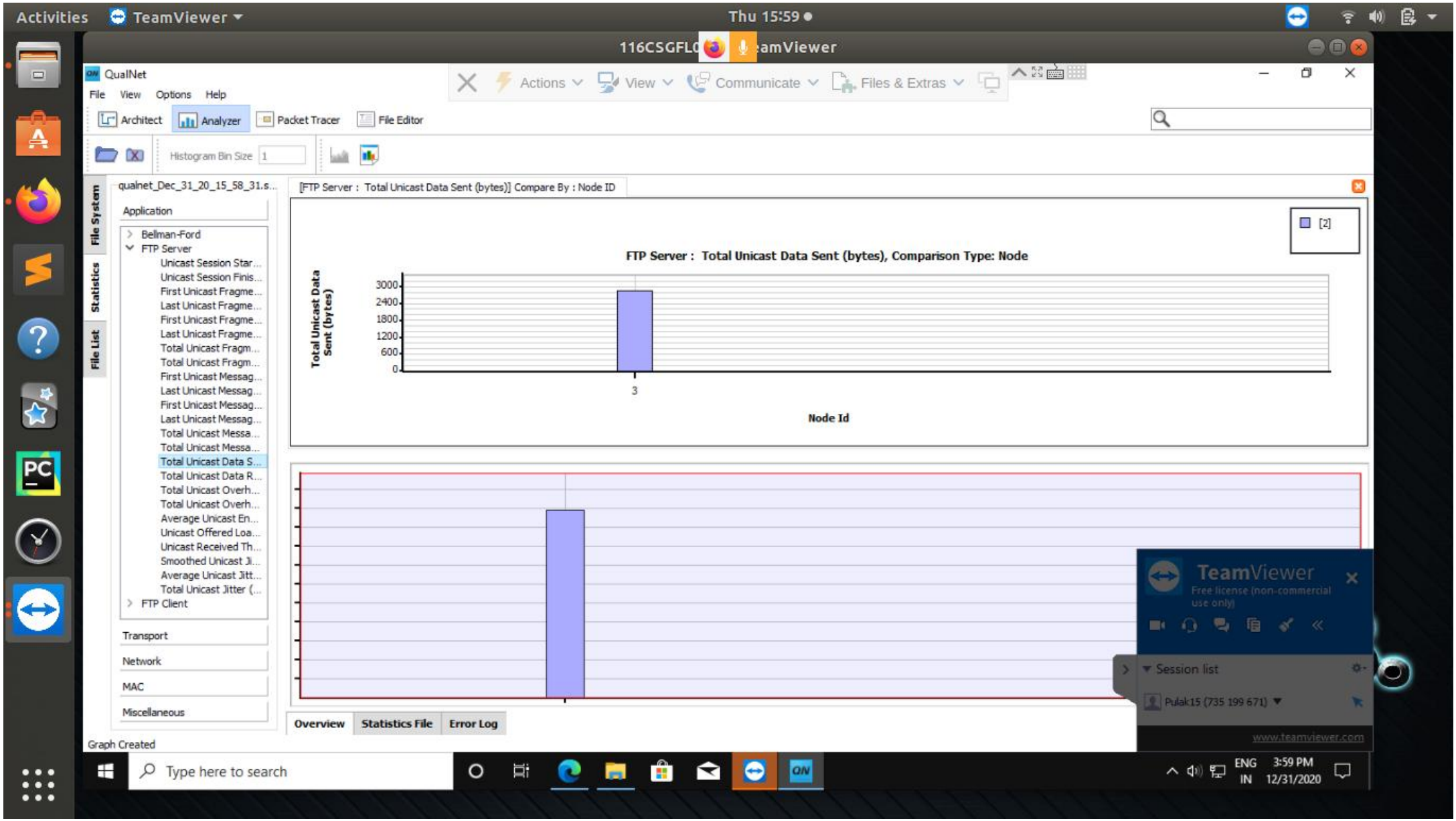
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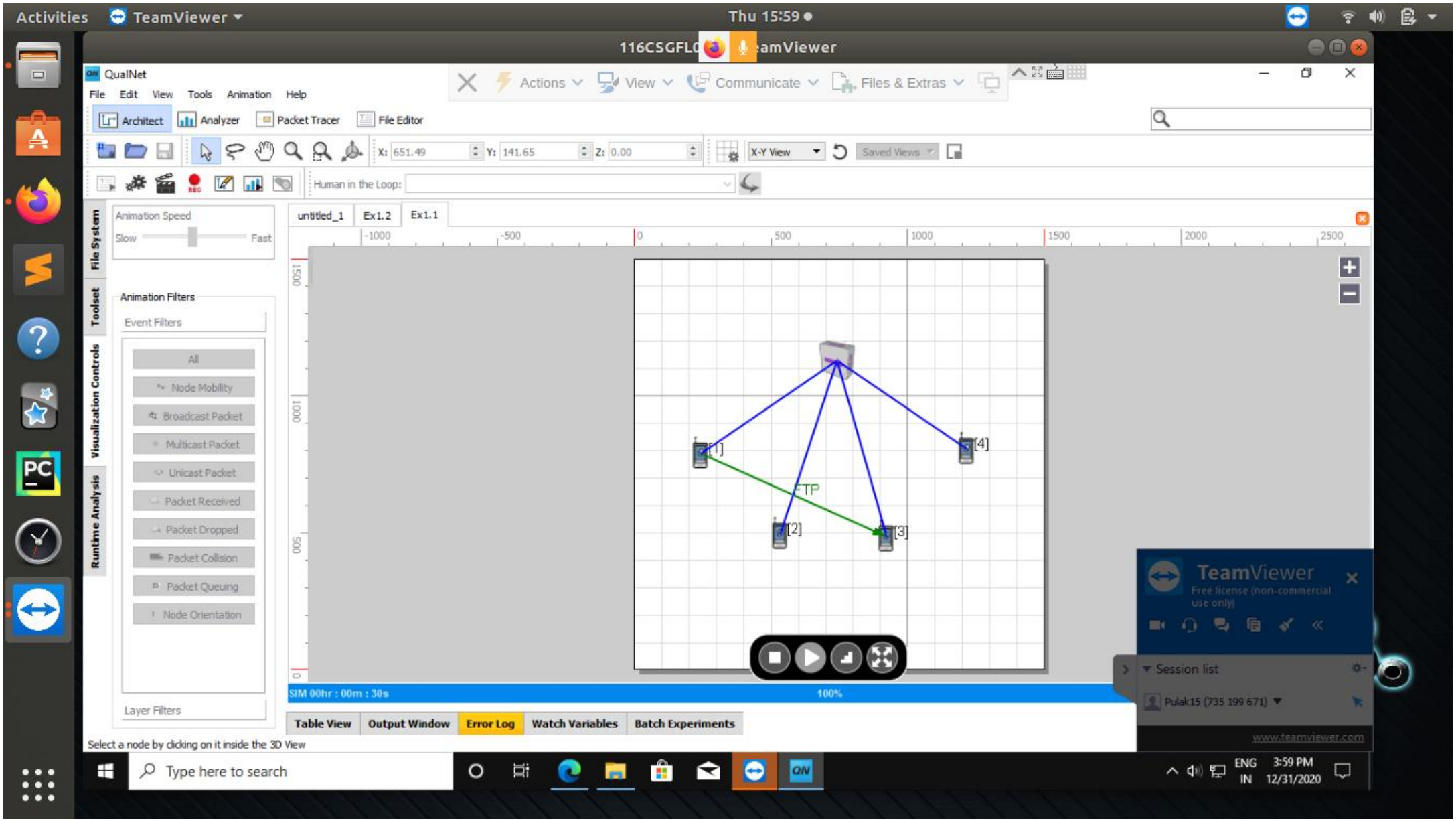
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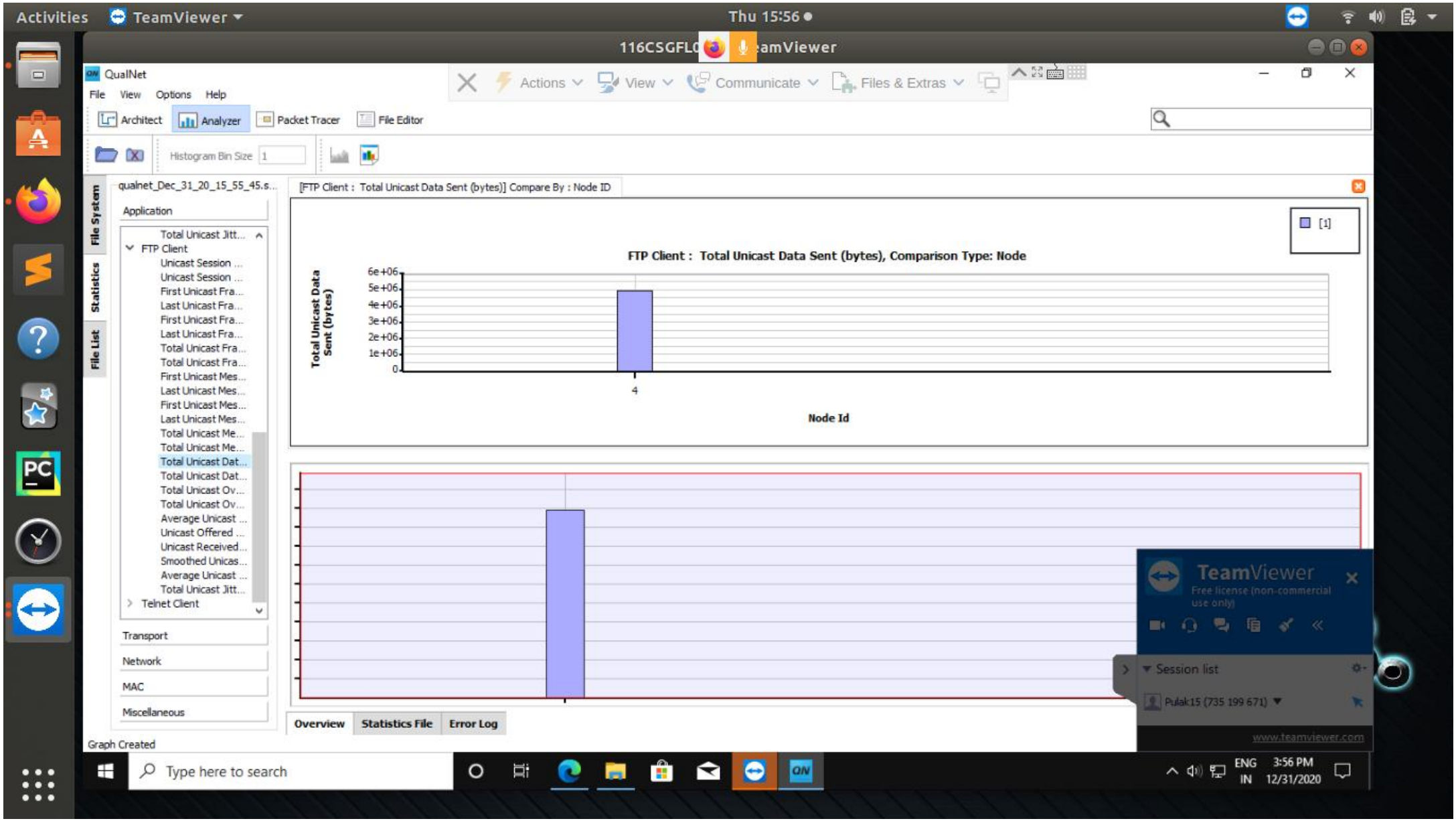
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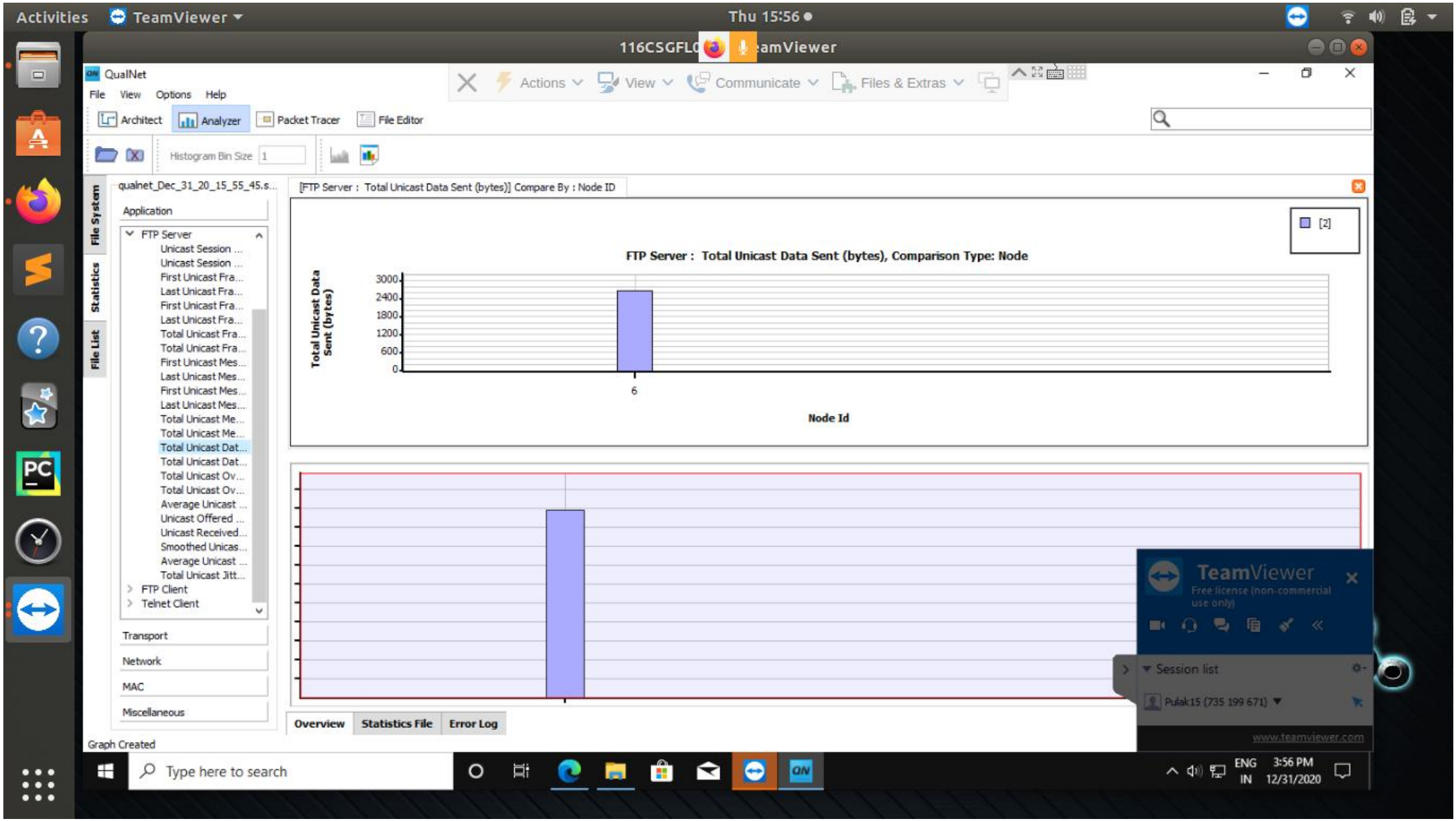
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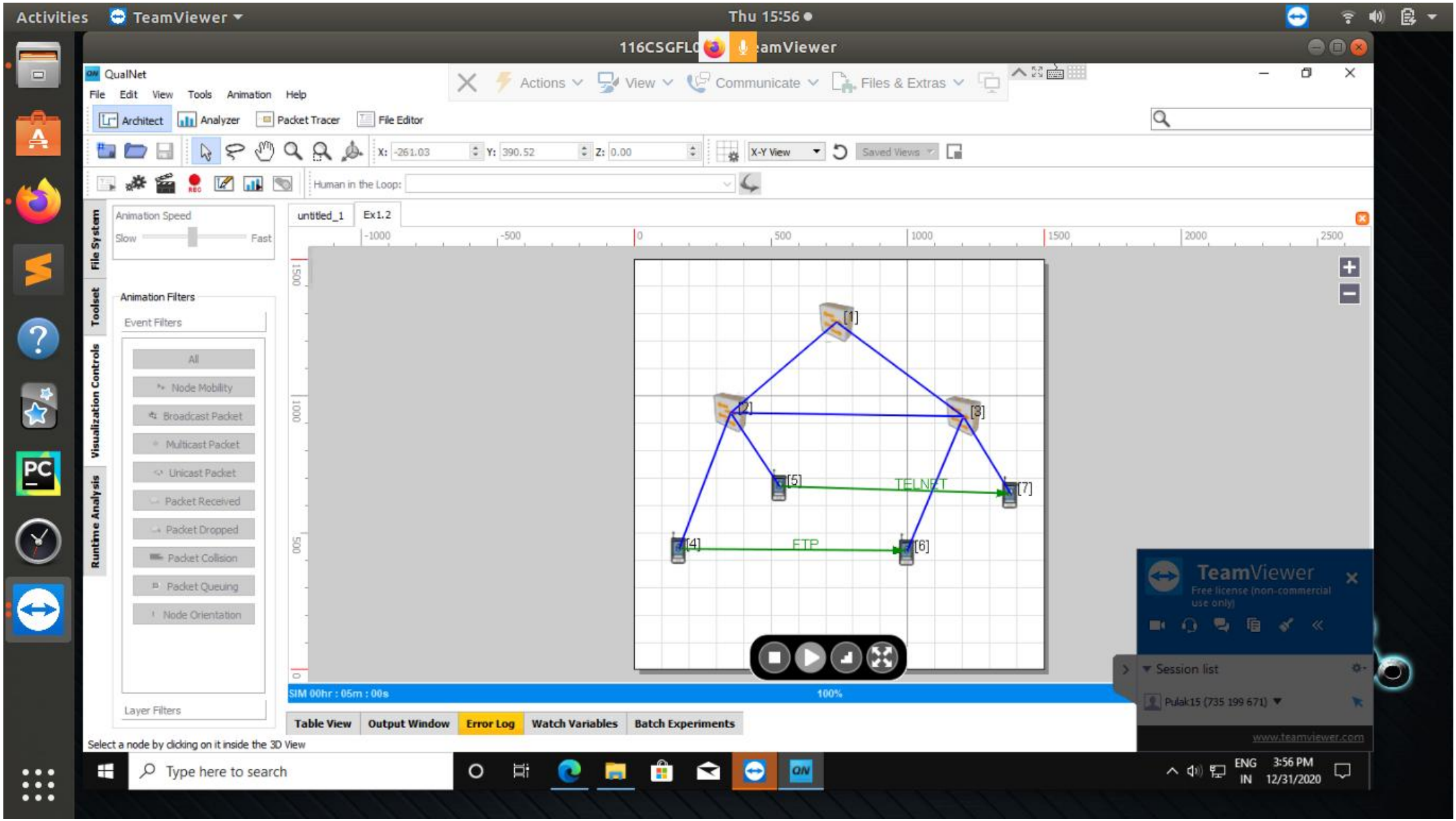
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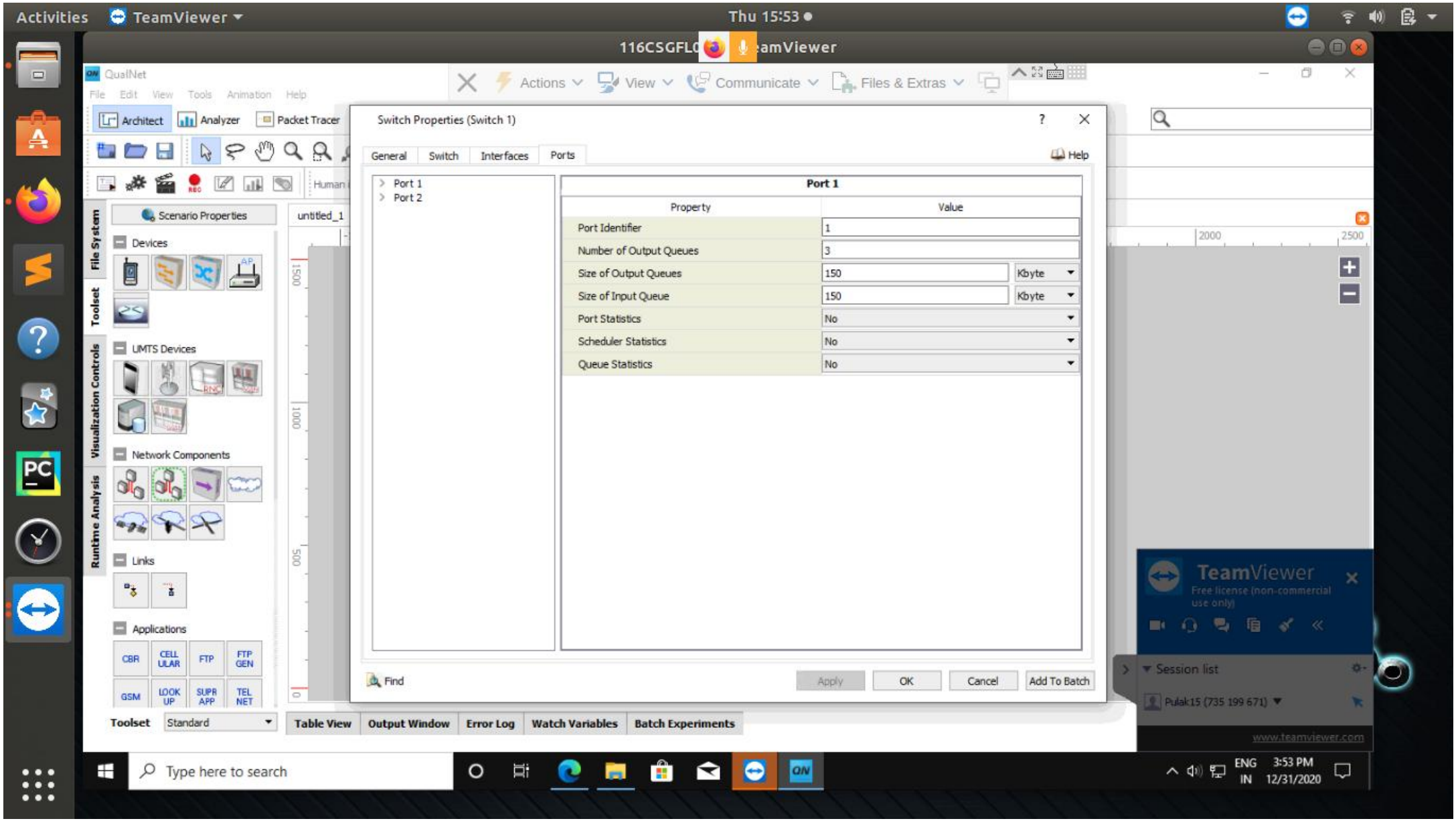
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Value
Port Identifier
1
Number of Output Queues
3
Size of Output Queues
150
Kbyte
Size of Input Queue
150
Kbyte
Port Statistics
No
Scheduler Statistics
No
Queue Statistics
No
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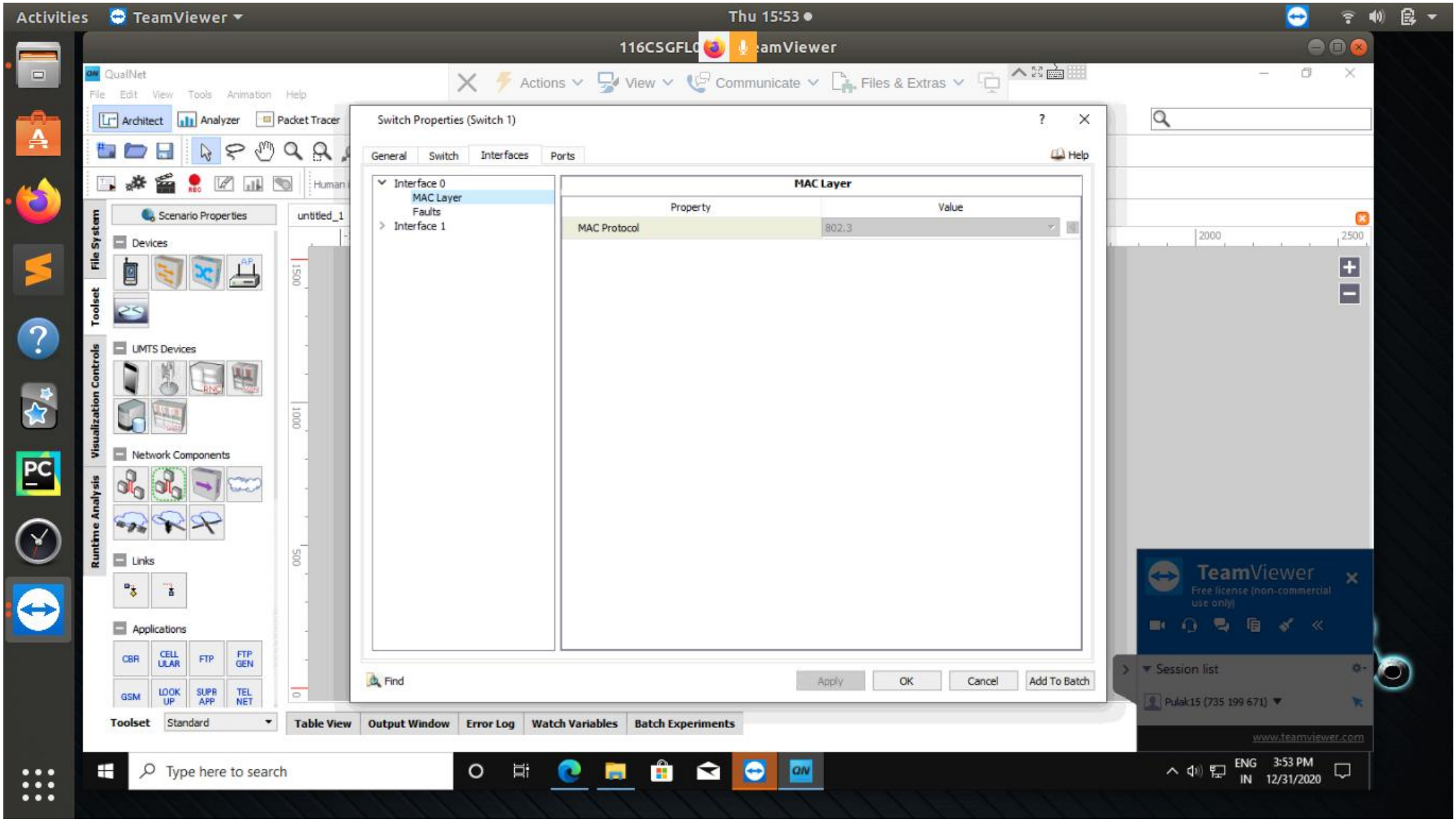
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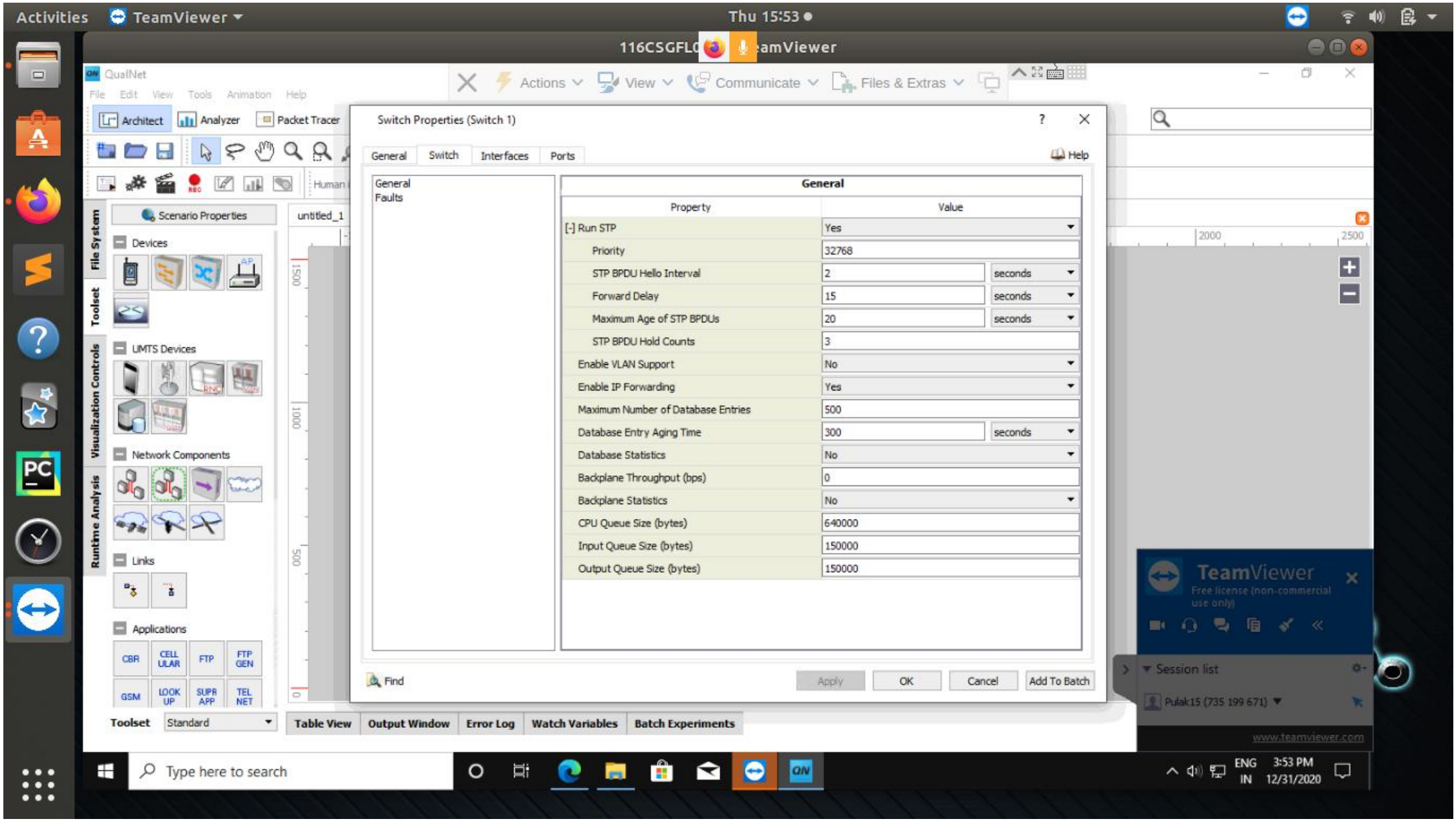
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Switch Properties (Switch 1)
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[-] Run STP
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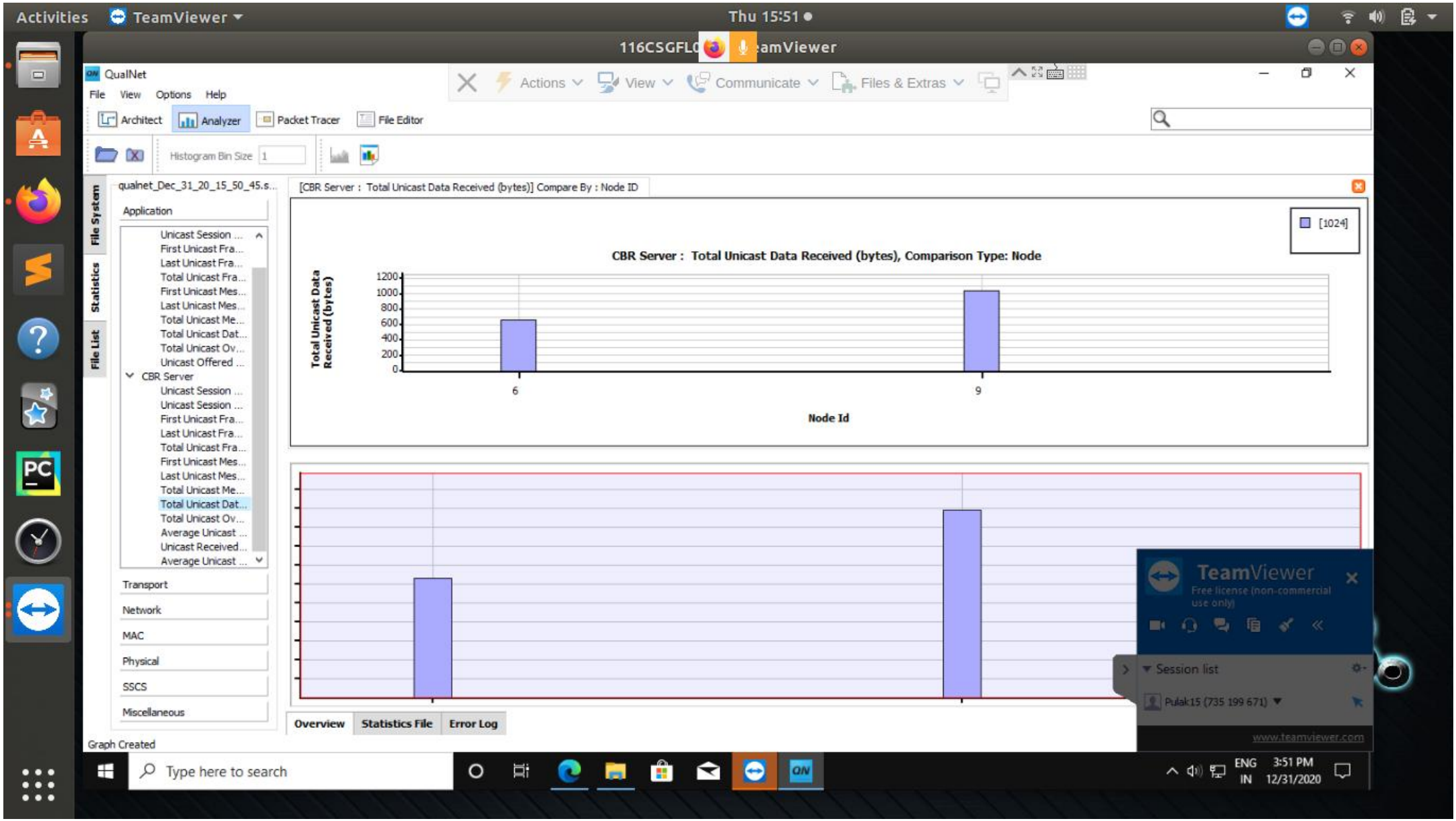
Priority
32768
STP BPDU Hello Interval
2
seconds
Forward Delay
15
seconds
Maximum Age of STP BPDUs
20
seconds
STP BPDU Hold Counts
3
Enable VLAN Support
No
Enable IP Forwarding
Yes
Maximum Number of Database Entries
500
Database Entry Aging Time
300
seconds
Database Statistics
No
Backplane Throughput (bps)
0
Backplane Statistics
No
CPU Queue Size (bytes)
640000
Input Queue Size (bytes)
150000
Output Queue Size (bytes)
150000
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:53 PM
12/31/2020


Activities
TeamViewer
Thu 15:51
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
qualnet_Dec_31_20_15_50_45.s...
[CBR Server : Total Unicast Data Received (bytes)] Compare By : Node ID
Application
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Unicast Offered ...
CBR Server
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Average Unicast ...
Unicast Received...
Average Unicast ...
Transport
Network
MAC
Physical
SSCS
Miscellaneous
File System
Statistics
File List
[1024]
CBR Server : Total Unicast Data Received (bytes), Comparison Type: Node
Total Unicast Data Received (bytes)
1200
1000
800
600
400
200
0
6
9
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
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Session list
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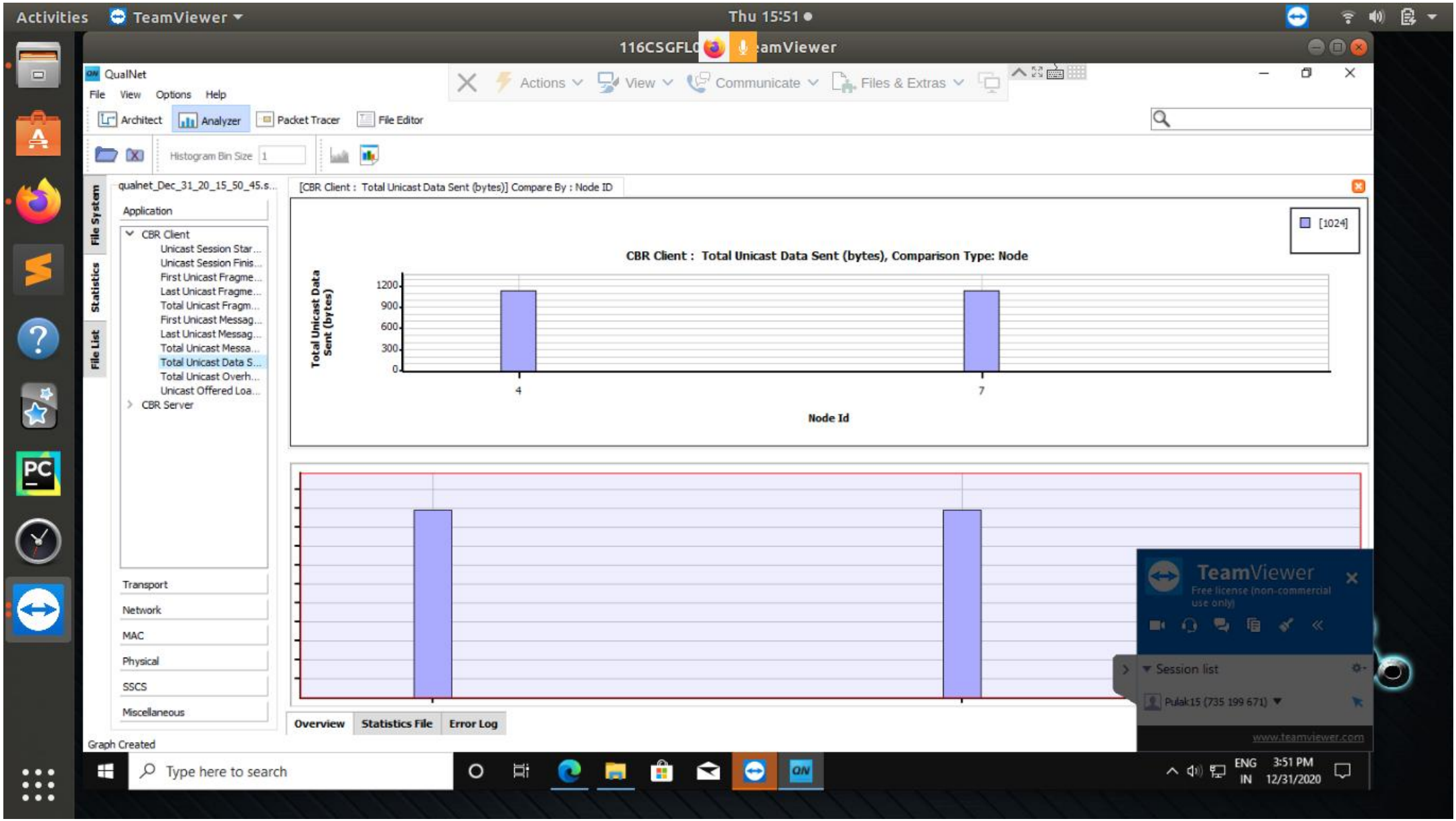
Activities
TeamViewer
Thu 15:51
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
qualnet_Dec_31_20_15_50_45.s...
[CBR Client : Total Unicast Data Sent (bytes)] Compare By : Node ID
Application
CBR Client
Unicast Session Star...
Unicast Session Finis...
First Unicast Fragme...
Last Unicast Fragme...
Total Unicast Fragm...
First Unicast Messag...
Last Unicast Messag...
Total Unicast Messa...
Total Unicast Data S...
Total Unicast Overh...
Unicast Offered Loa...
CBR Server
Transport
Network
MAC
Physical
SSCS
Miscellaneous
File System
Statistics
File List
[1024]
CBR Client : Total Unicast Data Sent (bytes), Comparison Type: Node
Total Unicast Data Sent (bytes)
1200
900
600
300
0
4
7
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
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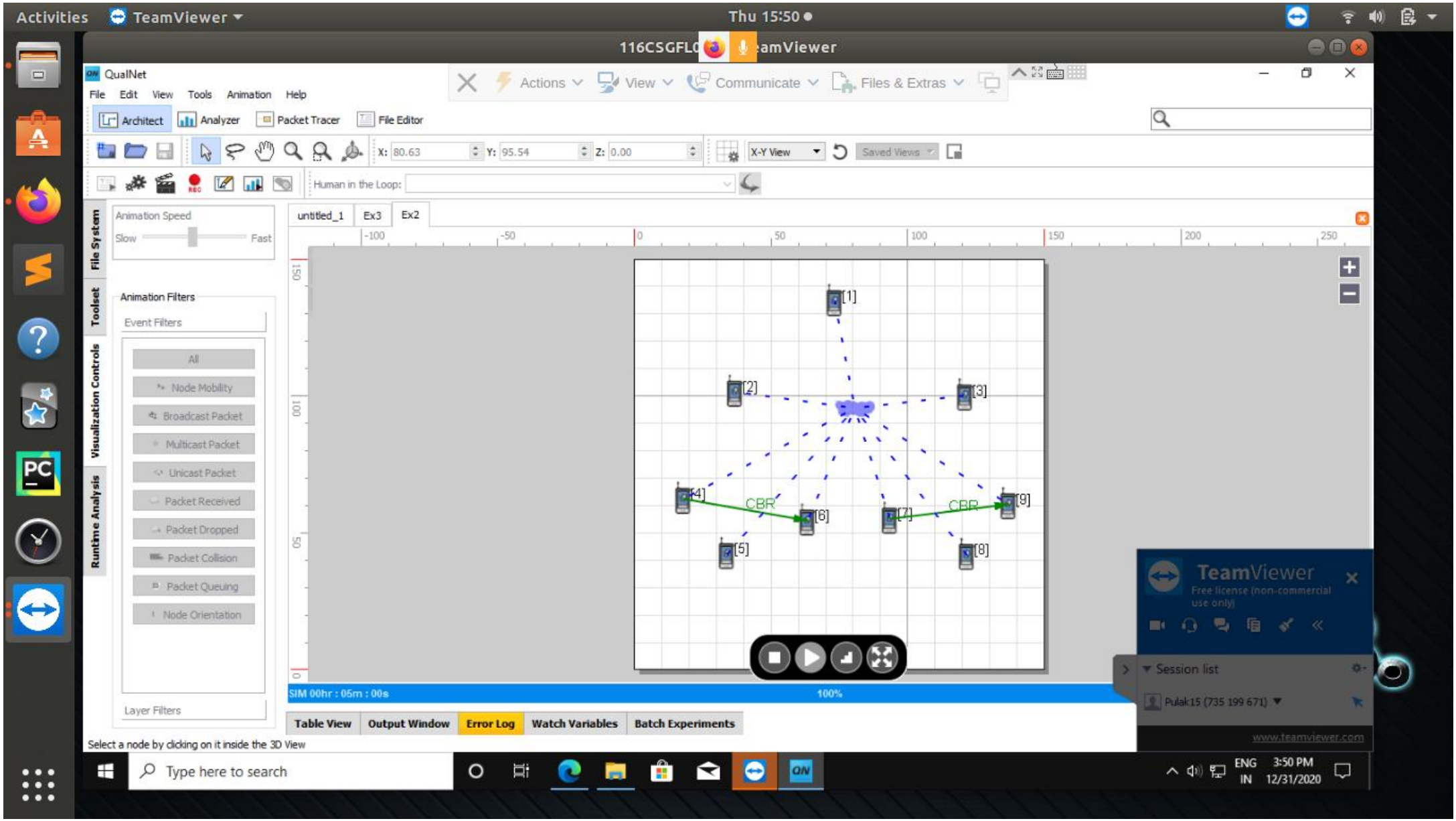
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:51 PM
12/31/2020


Activities
TeamViewer
Thu 15:50
QualNet
File Edit View Tools Animation Help
Actions View Communicate Files & Extras
Architect Analyzer Packet Tracer File Editor
Human in the Loop:
Animation Speed
Slow Fast
Animation Filters
Event Filters
All
Node Mobility
Broadcast Packet
Multicast Packet
Unicast Packet
Packet Received
Packet Dropped
Packet Collision
Packet Queuing
Node Orientation
Layer Filters
File System
Toolset
Visualization Controls
Runtime Analysis
untitled_1
Ex3
Ex2
[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
[9]
CBR
CBR
SIM 00hr : 05m : 00s
100%
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
Select a node by clicking on it inside the 3D View
TeamViewer
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Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:50 PM
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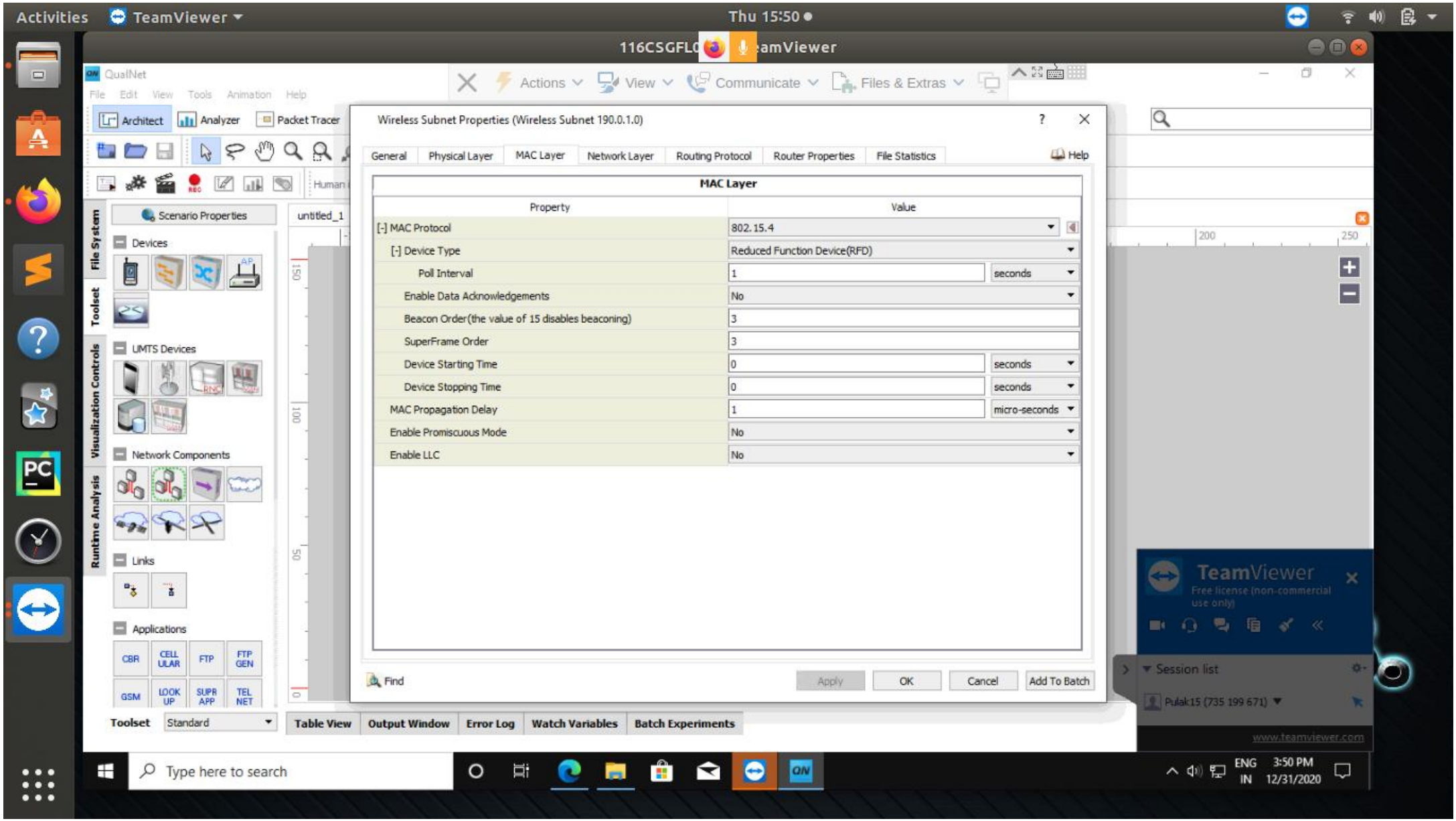
Activities
TeamViewer
Thu 15:50
QualNet
File Edit View Tools Animation Help
Architect
Analyzer
Packet Tracer
Actions
View
Communicate
Files & Extras
Wireless Subnet Properties (Wireless Subnet 190.0.1.0)
General
Physical Layer
MAC Layer
Network Layer
Routing Protocol
Router Properties
File Statistics
Help
MAC Layer
Property
Value
[-] MAC Protocol
802.15.4
[-] Device Type
Reduced Function Device(RFD)
Poll Interval
1
seconds
Enable Data Acknowledgements
No
Beacon Order(the value of 15 disables beaconing)
3
SuperFrame Order
3
Device Starting Time
0
seconds
Device Stopping Time
0
seconds
MAC Propagation Delay
1
micro-seconds
Enable Promiscuous Mode
No
Enable LLC
No
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOK UP
SUPR APP
TEL NET
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
TeamViewer
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Session list
Pulak15 (735 199 671)
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Type here to search
ENG
IN
3:50 PM
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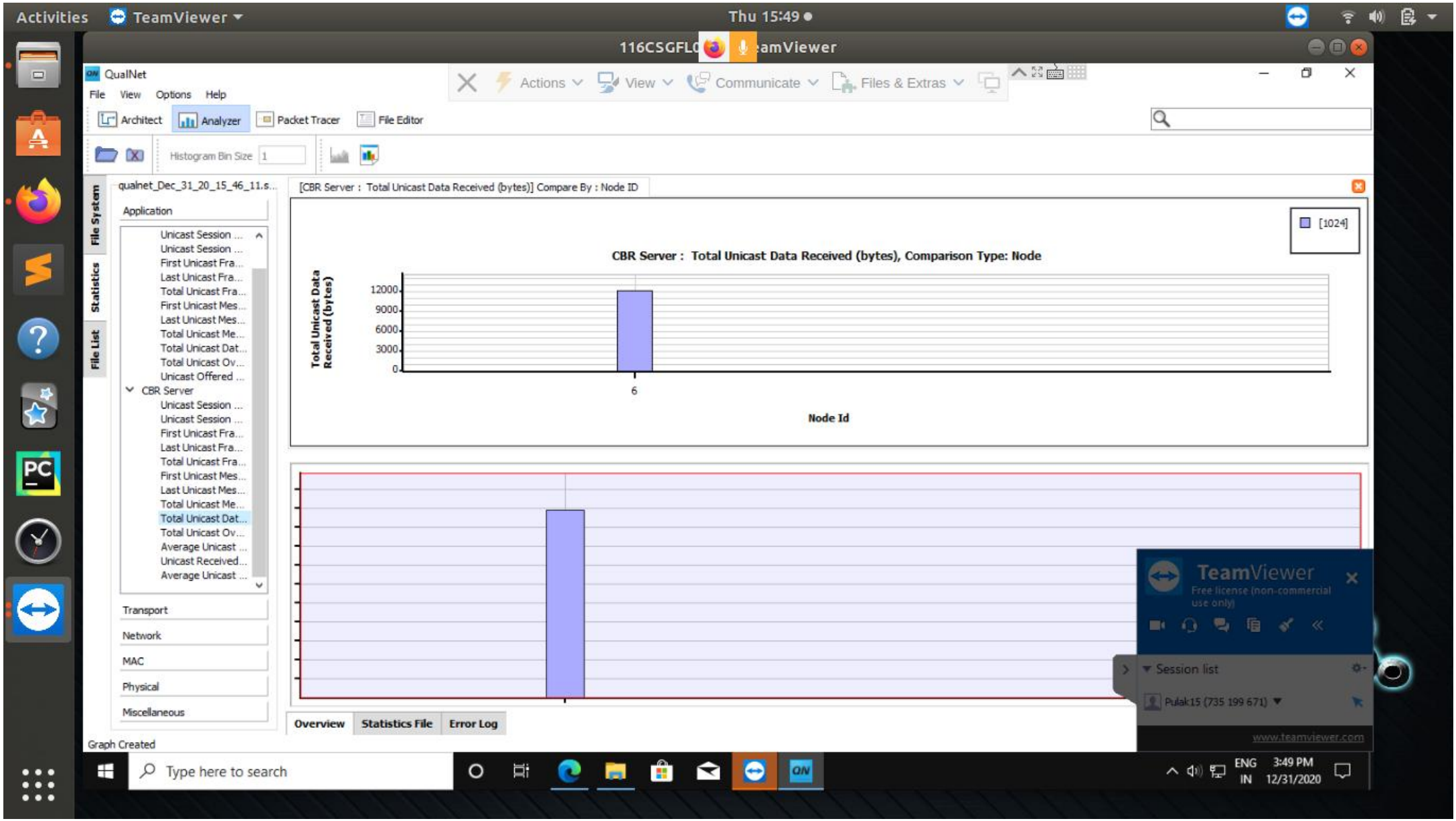
Activities
TeamViewer
Thu 15:49
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
qualnet_Dec_31_20_15_46_11.s...
[CBR Server : Total Unicast Data Received (bytes)] Compare By : Node ID
Application
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Unicast Offered ...
CBR Server
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Average Unicast ...
Unicast Received...
Average Unicast ...
Transport
Network
MAC
Physical
Miscellaneous
[1024]
CBR Server : Total Unicast Data Received (bytes), Comparison Type: Node
Total Unicast Data Received (bytes)
12000
9000
6000
3000
0
6
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
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Session list
Pulak15 (735 199 671)
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Type here to search
ENG
IN
3:49 PM
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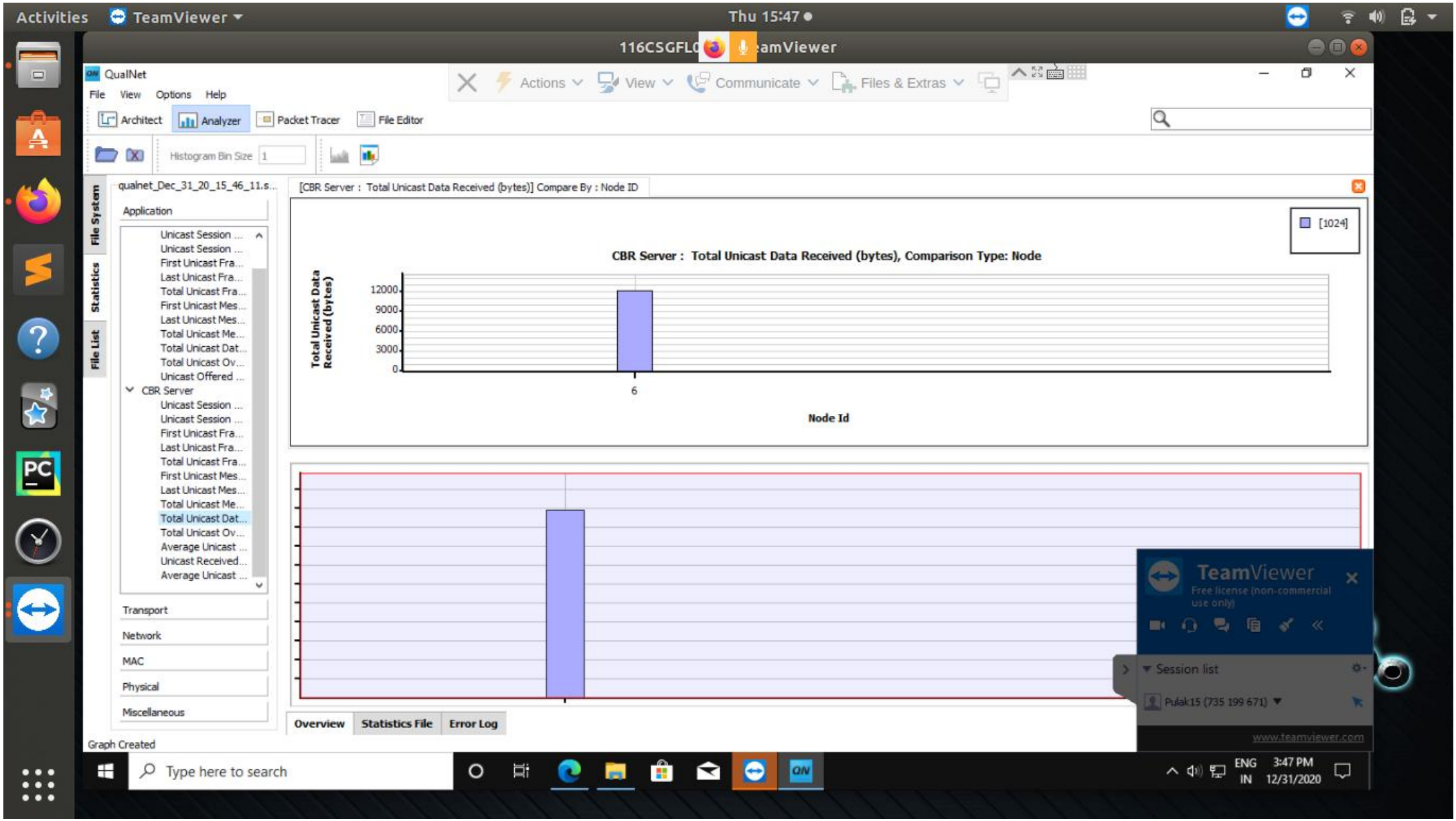
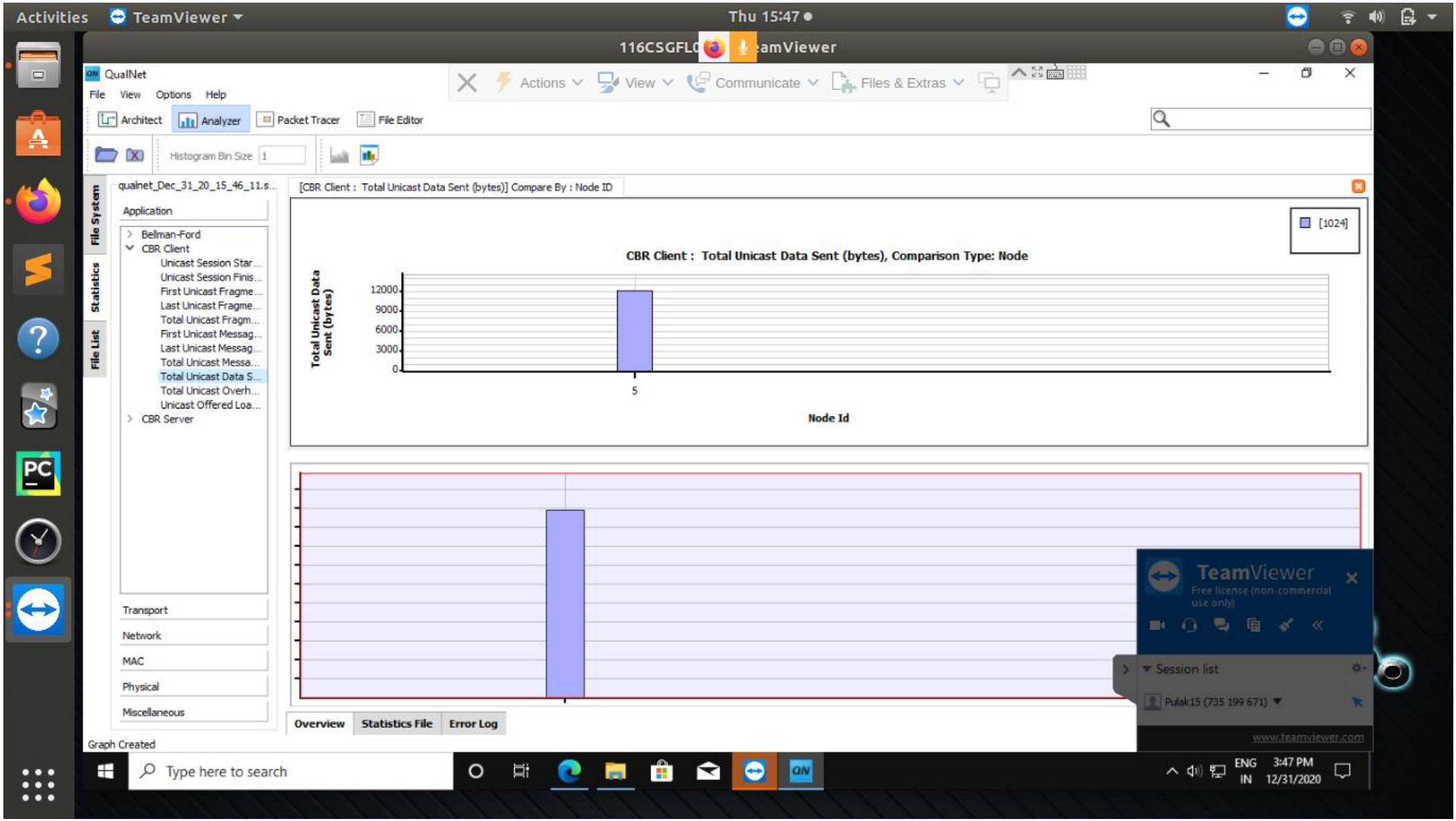

Activities
TeamViewer
Thu 15:47
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
qualnet_Dec_31_20_15_46_11.s...
[CBR Server : Total Unicast Data Received (bytes)] Compare By : Node ID
Application
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Unicast Offered ...
CBR Server
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Ov...
Average Unicast ...
Unicast Received...
Average Unicast ...
Transport
Network
MAC
Physical
Miscellaneous
[1024]
CBR Server : Total Unicast Data Received (bytes), Comparison Type: Node
Total Unicast Data Received (bytes)
12000
9000
6000
3000
0
6
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:47 PM
12/31/2020


Activities
TeamViewer
Thu 15:47
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
qualnet_Dec_31_20_15_46_11.s...
[CBR Client : Total Unicast Data Sent (bytes)] Compare By : Node ID
Application
Bellman-Ford
CBR Client
Unicast Session Star...
Unicast Session Finis...
First Unicast Fragme...
Last Unicast Fragme...
Total Unicast Fragm...
First Unicast Messag...
Last Unicast Messag...
Total Unicast Messa...
Total Unicast Data S...
Total Unicast Overh...
Unicast Offered Loa...
CBR Server
Transport
Network
MAC
Physical
Miscellaneous
File System
Statistics
File List
[1024]
CBR Client : Total Unicast Data Sent (bytes), Comparison Type: Node
Total Unicast Data Sent (bytes)
12000
9000
6000
3000
0
5
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
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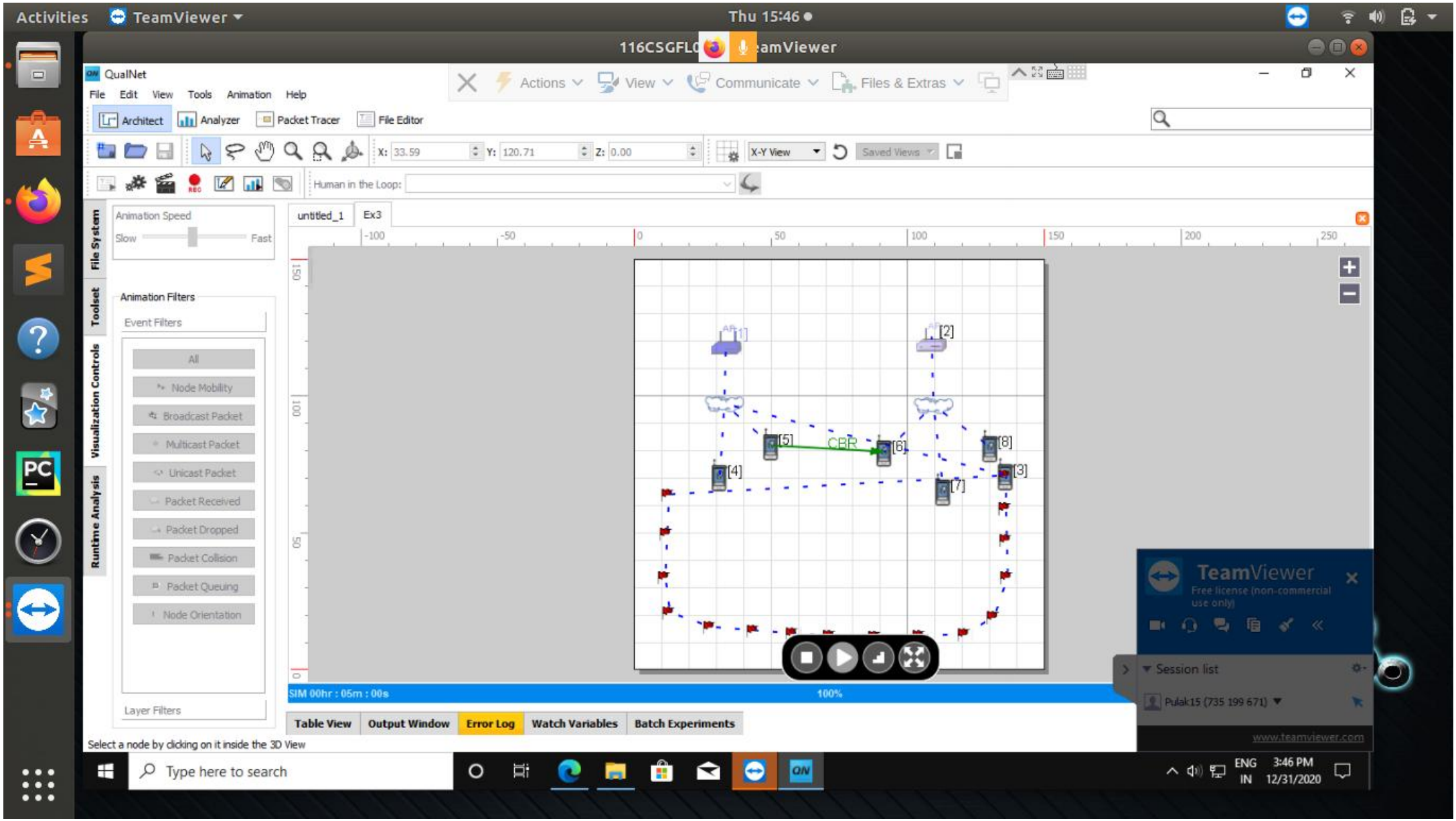
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:47 PM
12/31/2020


Activities
TeamViewer
Thu 15:46
QualNet
File Edit View Tools Animation Help
Actions View Communicate Files & Extras
Architect Analyzer Packet Tracer File Editor
Human in the Loop:
File System
Toolset
Visualization Controls
Runtime Analysis
Animation Speed
Slow Fast
Animation Filters
Event Filters
All
Node Mobility
Broadcast Packet
Multicast Packet
Unicast Packet
Packet Received
Packet Dropped
Packet Collision
Packet Queuing
Node Orientation
Layer Filters
untitled_1
Ex3
CBR
SIM 00hr : 05m : 00s
100%
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
Select a node by clicking on it inside the 3D View
TeamViewer
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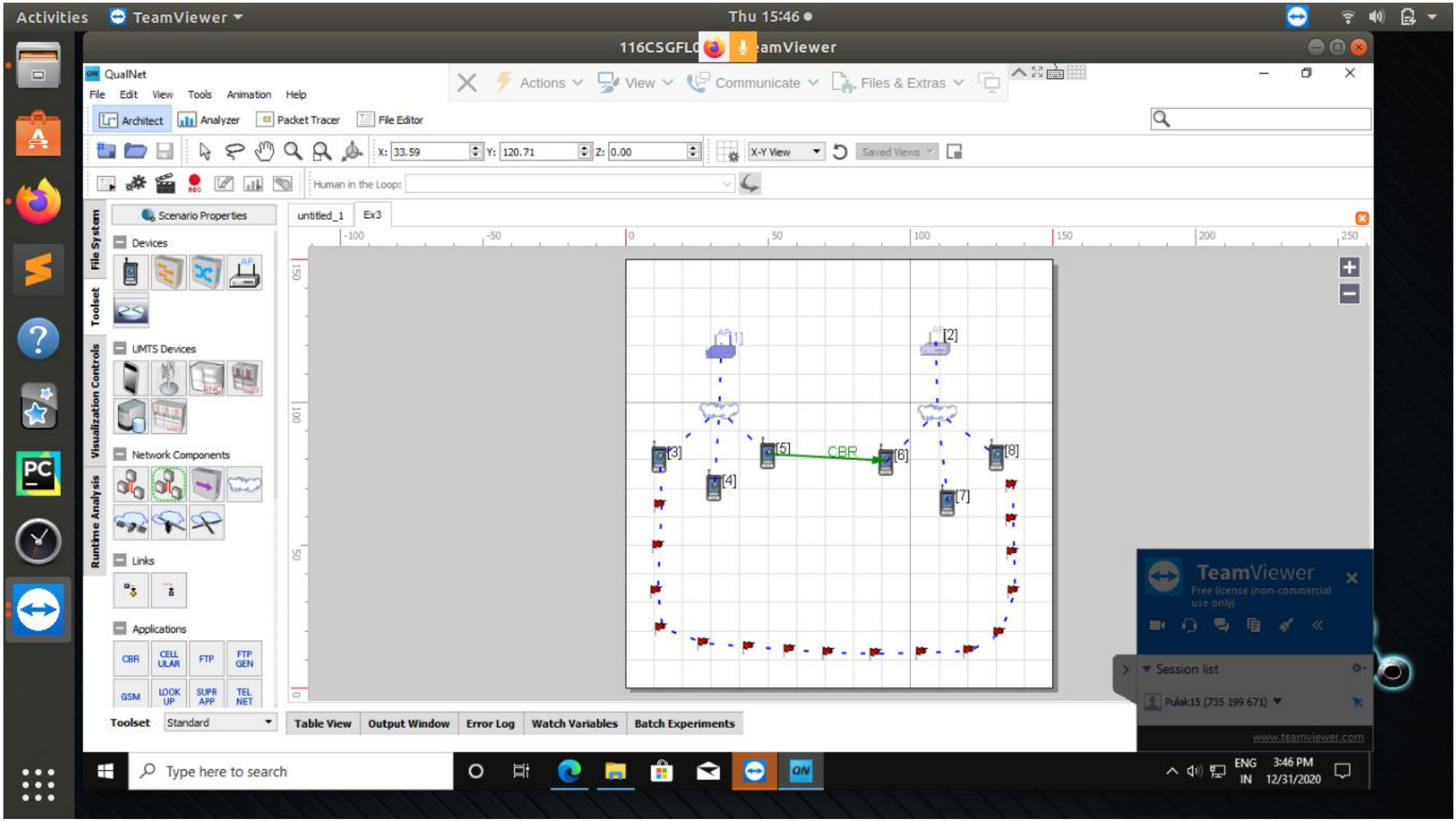
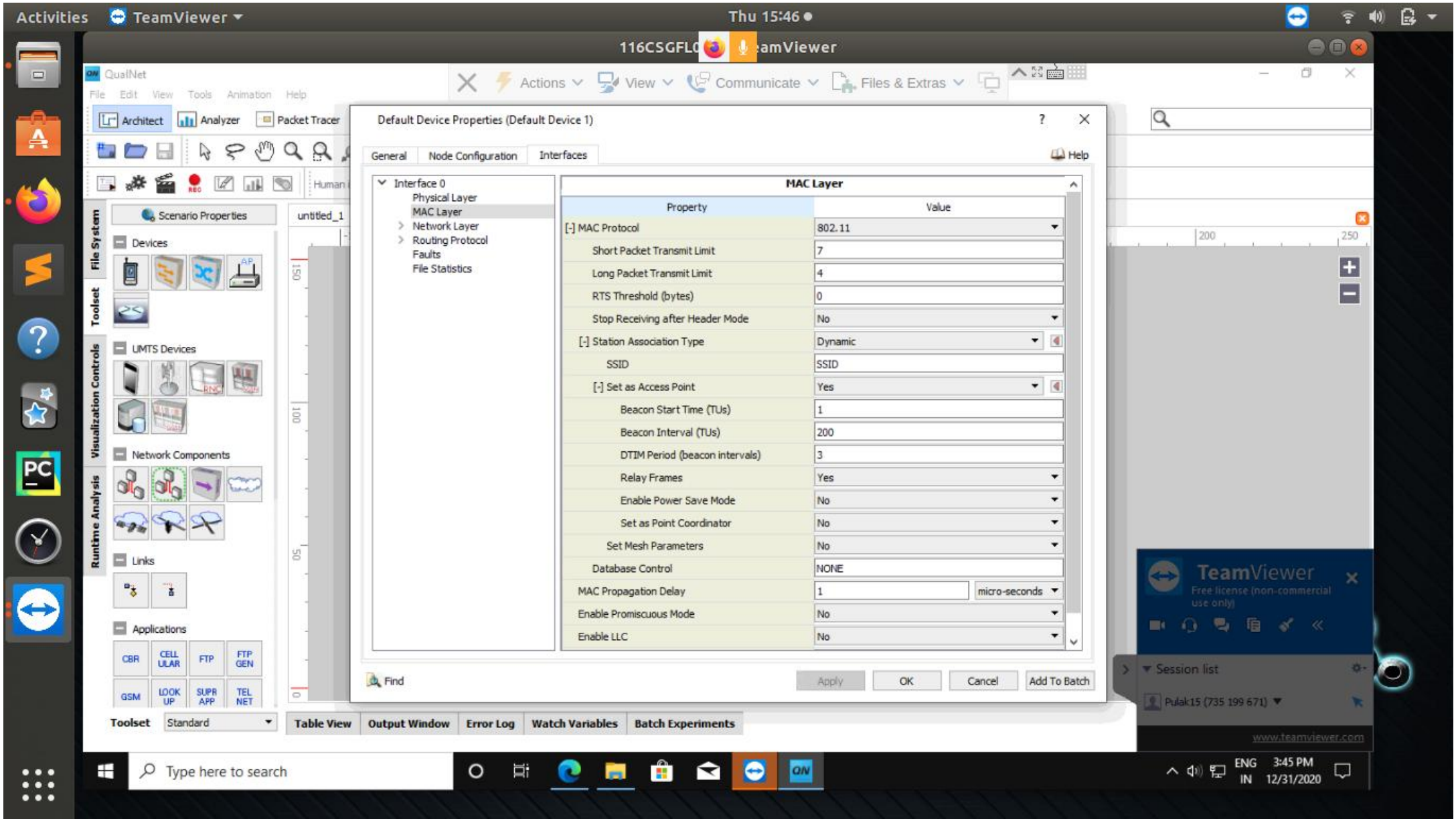
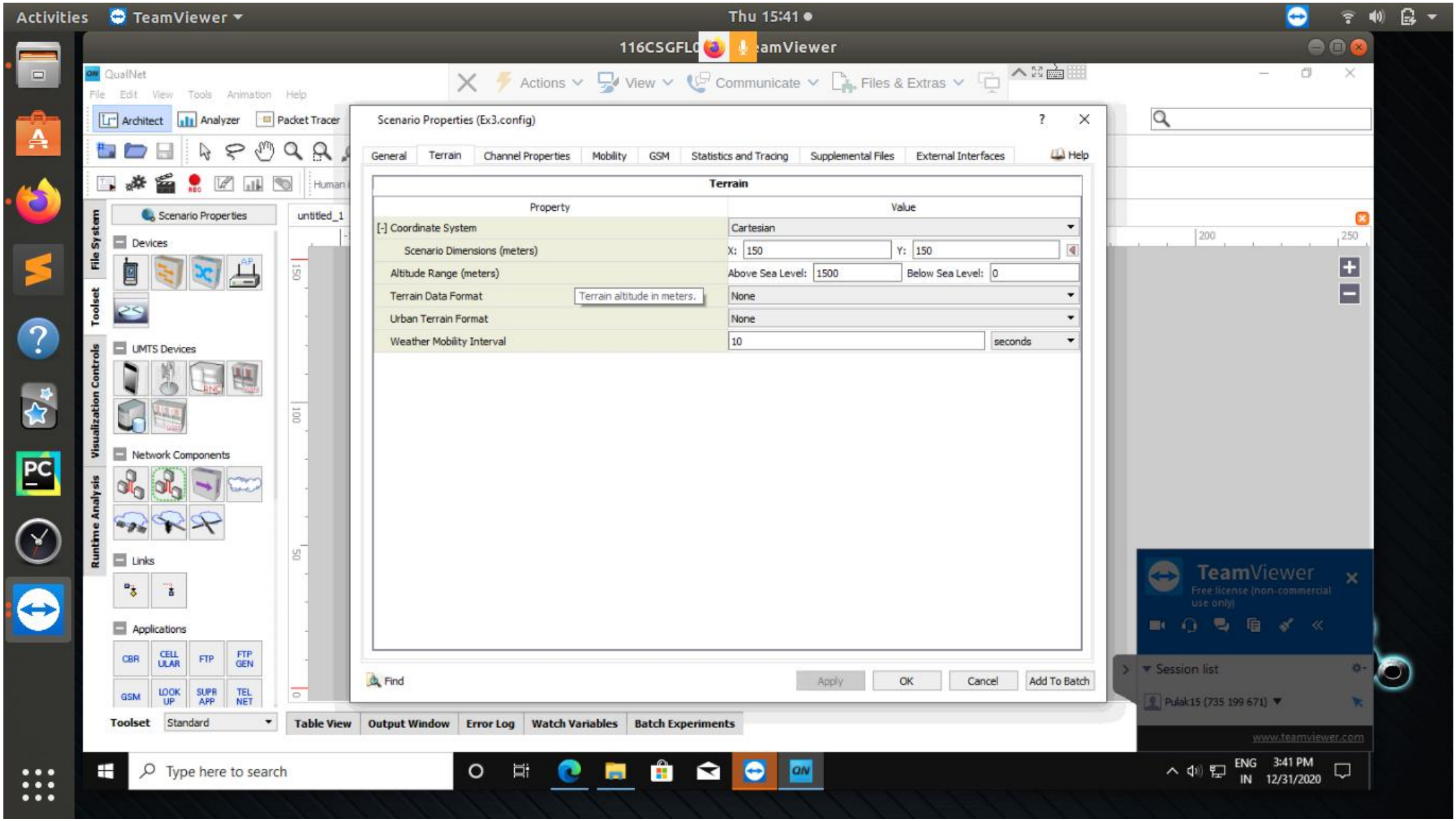
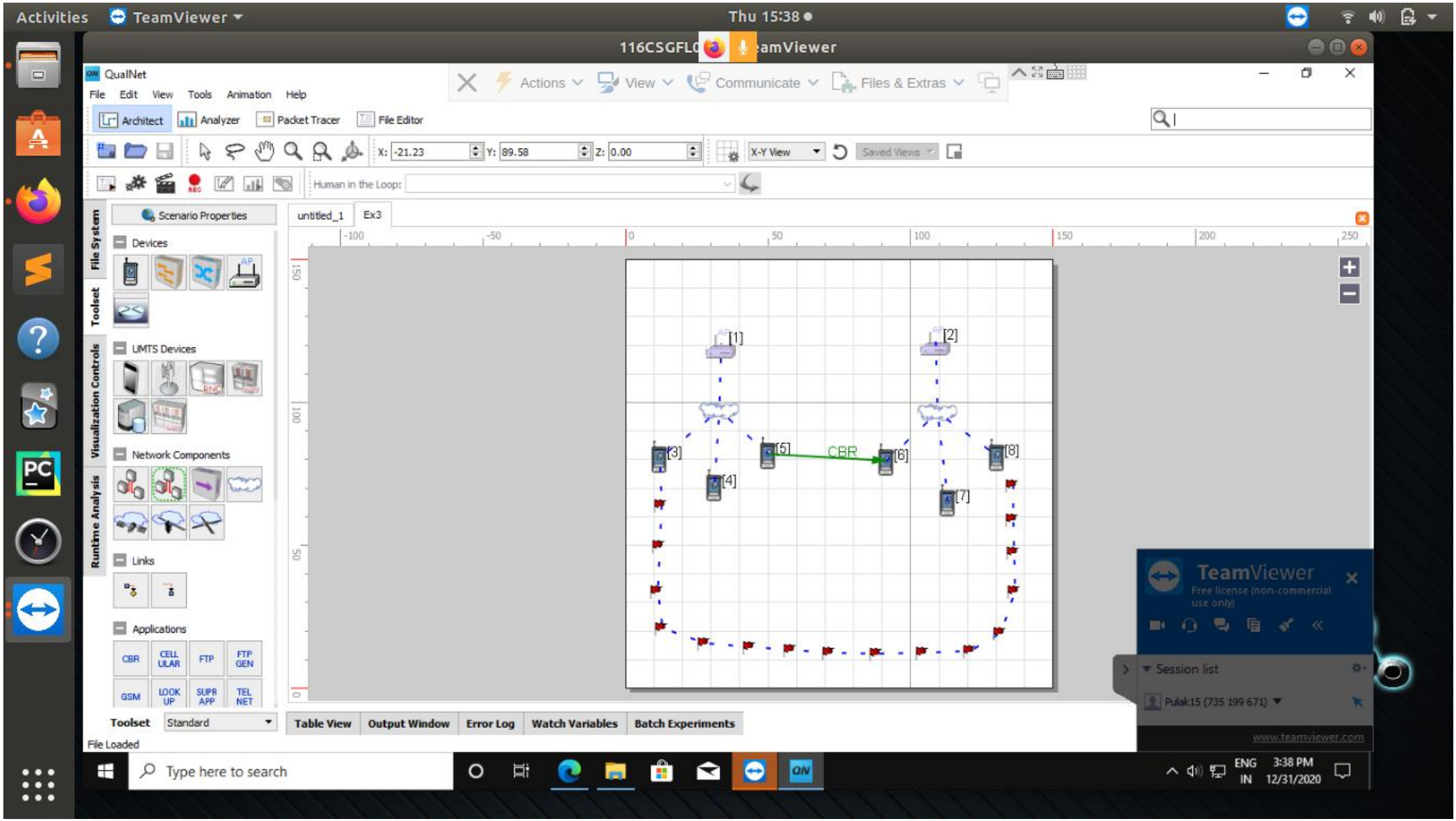
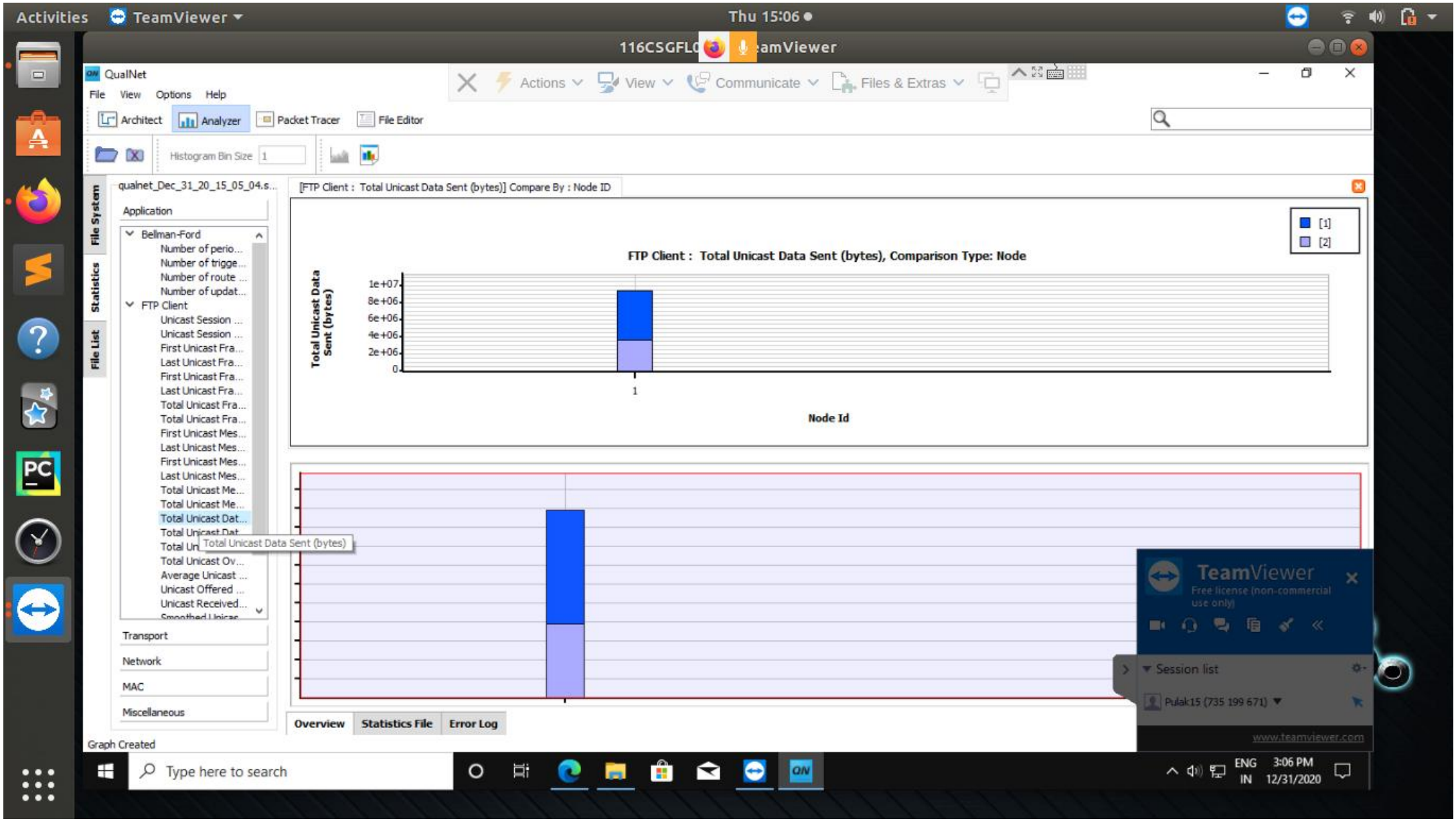
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:46 PM
12/31/2020

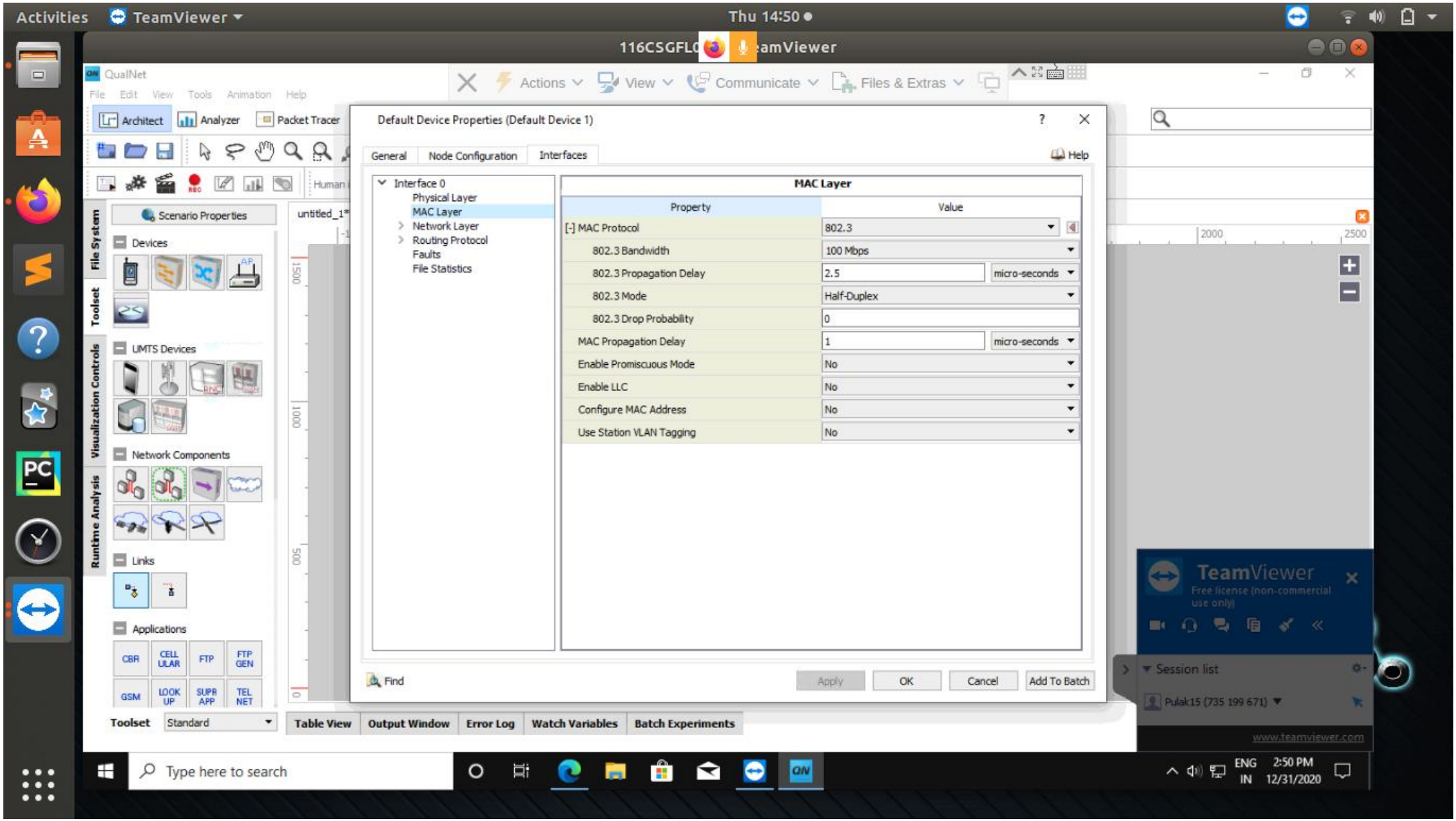

Activities
TeamViewer
Thu 15:46
QualNet
File Edit View Tools Animation Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
X: 33.59
Y: 120.71
Z: 0.00
X-Y View
Saved Views
Human in the Loop:
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOK UP
SUPR APP
TEL NET
Toolset
Standard
untitled_1
Ex3
[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
CBR
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:46 PM
12/31/2020

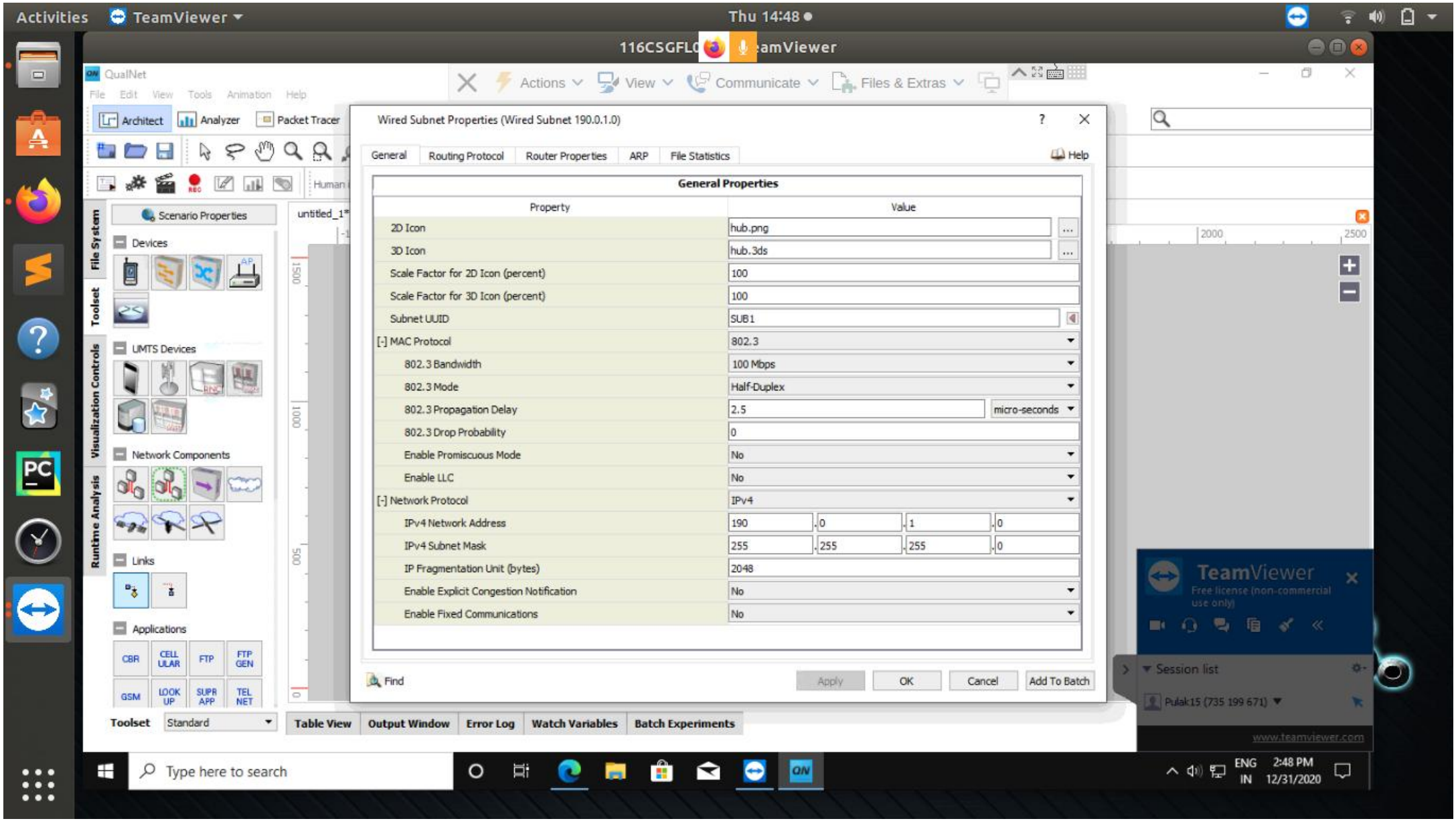

Activities
TeamViewer
Thu 15:46
QualNet
File Edit View Tools Animation Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
Default Device Properties (Default Device 1)
General
Node Configuration
Interfaces
Help
Interface 0
Physical Layer
MAC Layer
Network Layer
Routing Protocol
Faults
File Statistics
MAC Layer
Property
Value
[-] MAC Protocol
802.11
Short Packet Transmit Limit
7
Long Packet Transmit Limit
4
RTS Threshold (bytes)
0
Stop Receiving after Header Mode
No
[-] Station Association Type
Dynamic
SSID
SSID
[-] Set as Access Point
Yes
Beacon Start Time (TUs)
1
Beacon Interval (TUs)
200
DTIM Period (beacon intervals)
3
Relay Frames
Yes
Enable Power Save Mode
No
Set as Point Coordinator
No
Set Mesh Parameters
No
Database Control
NONE
MAC Propagation Delay
1
micro-seconds
Enable Promiscuous Mode
No
Enable LLC
No
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
TeamViewer
Session list
Type here to search
ENG
IN
3:45 PM
12/31/2020

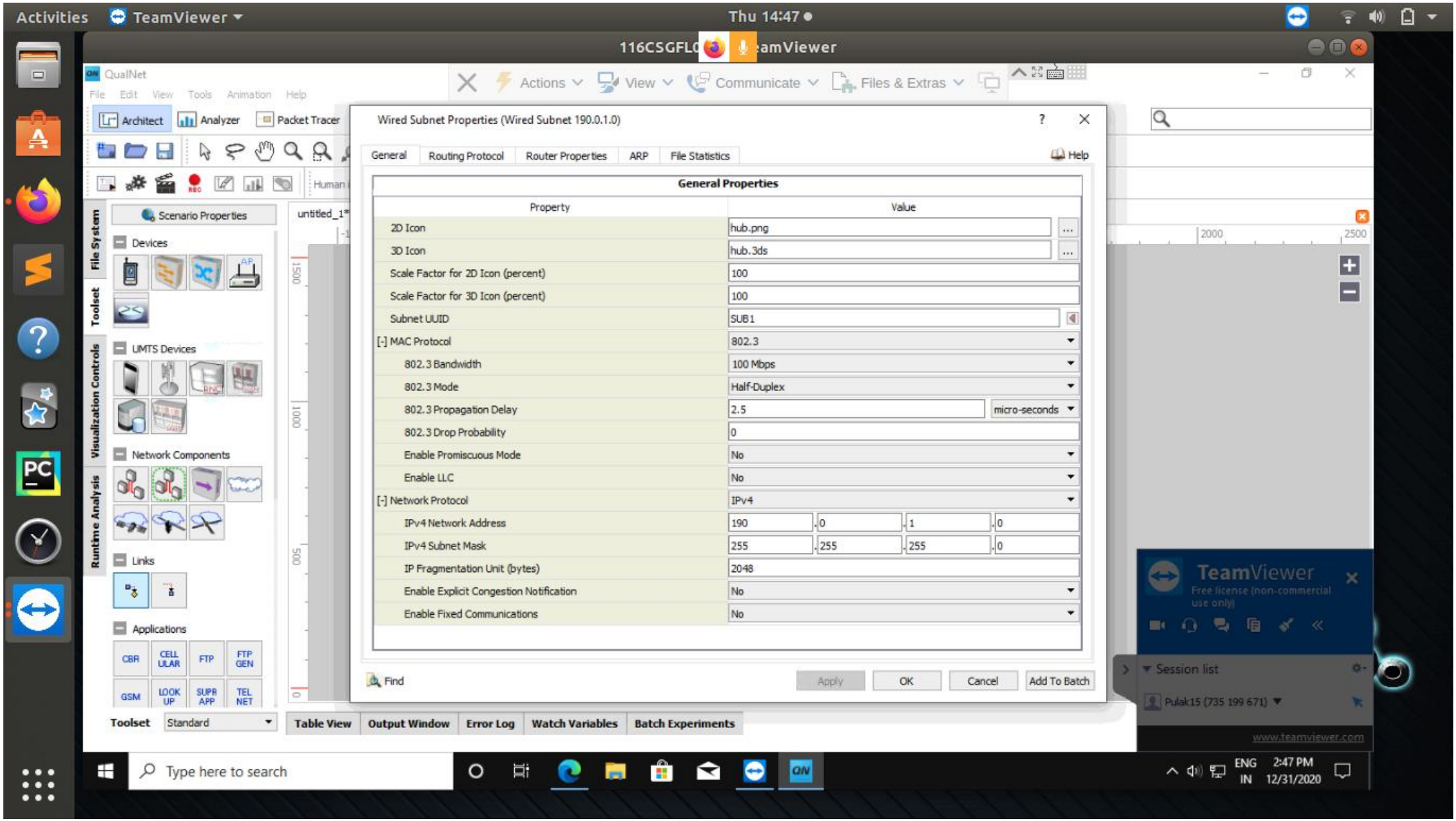

Activities
TeamViewer
Thu 15:41
QualNet
File Edit View Tools Animation Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
Scenario Properties (Ex3.config)
General
Terrain
Channel Properties
Mobility
GSM
Statistics and Tracing
Supplemental Files
External Interfaces
Help
Terrain
Property
Value
[-] Coordinate System
Cartesian
Scenario Dimensions (meters)
X: 150
Y: 150
Altitude Range (meters)
Above Sea Level: 1500
Below Sea Level: 0
Terrain Data Format
Terrain altitude in meters.
None
Urban Terrain Format
None
Weather Mobility Interval
10
seconds
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOKUP
SUPR APP
TEL NET
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
File System
Toolset
Visualization Controls
Runtime Analysis
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:41 PM
12/31/2020


Activities
TeamViewer
Thu 15:38
QualNet
File Edit View Tools Animation Help
Actions View Communicate Files & Extras
Architect Analyzer Packet Tracer File Editor
Human in the Loop:
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOK UP
SUPR APP
TEL NET
untitled_1
Ex3
[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
CBR
Toolset Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
File Loaded
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG IN
3:38 PM 12/31/2020


Activities
TeamViewer
Thu 15:06
QualNet
File View Options Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
Histogram Bin Size
File System
Statistics
File List
qualnet_Dec_31_20_15_05_04.s...
Application
Bellman-Ford
Number of perio...
Number of trigge...
Number of route ...
Number of updat...
FTP Client
Unicast Session ...
Unicast Session ...
First Unicast Fra...
Last Unicast Fra...
First Unicast Fra...
Last Unicast Fra...
Total Unicast Fra...
Total Unicast Fra...
First Unicast Mes...
Last Unicast Mes...
First Unicast Mes...
Last Unicast Mes...
Total Unicast Me...
Total Unicast Me...
Total Unicast Dat...
Total Unicast Data Sent (bytes)
Total Unicast Ov...
Average Unicast ...
Unicast Offered ...
Unicast Received...
Transport
Network
MAC
Miscellaneous
[FTP Client : Total Unicast Data Sent (bytes)] Compare By : Node ID
FTP Client : Total Unicast Data Sent (bytes), Comparison Type: Node
[1]
[2]
Total Unicast Data Sent (bytes)
1e+07
8e+06
6e+06
4e+06
2e+06
0
1
Node Id
Overview
Statistics File
Error Log
Graph Created
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
3:06 PM
12/31/2020


Activities
TeamViewer
Thu 14:50
QualNet
File Edit View Tools Animation Help
Architect
Analyzer
Packet Tracer
Actions
View
Communicate
Files & Extras
Default Device Properties (Default Device 1)
General
Node Configuration
Interfaces
Help
Interface 0
Physical Layer
MAC Layer
Network Layer
Routing Protocol
Faults
File Statistics
MAC Layer
Property
Value
[-] MAC Protocol
802.3
802.3 Bandwidth
100 Mbps
802.3 Propagation Delay
2.5
micro-seconds
802.3 Mode
Half-Duplex
802.3 Drop Probability
0
MAC Propagation Delay
1
micro-seconds
Enable Promiscuous Mode
No
Enable LLC
No
Configure MAC Address
No
Use Station VLAN Tagging
No
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOKUP
SUPR APP
TELNET
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
File System
Toolset
Visualization Controls
Runtime Analysis
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
2:50 PM
12/31/2020


Activities
TeamViewer
Thu 14:48
QualNet
File Edit View Tools Animation Help
Architect
Analyzer
Packet Tracer
Actions
View
Communicate
Files & Extras
Wired Subnet Properties (Wired Subnet 190.0.1.0)
General
Routing Protocol
Router Properties
ARP
File Statistics
Help
General Properties
Property
Value
2D Icon
hub.png
3D Icon
hub.3ds
Scale Factor for 2D Icon (percent)
100
Scale Factor for 3D Icon (percent)
100
Subnet UUID
SUB1
[-] MAC Protocol
802.3
802.3 Bandwidth
100 Mbps
802.3 Mode
Half-Duplex
802.3 Propagation Delay
2.5
micro-seconds
802.3 Drop Probability
0
Enable Promiscuous Mode
No
Enable LLC
No
[-] Network Protocol
IPv4
IPv4 Network Address
190 . 0 . 1 . 0
IPv4 Subnet Mask
255 . 255 . 255 . 0
IP Fragmentation Unit (bytes)
2048
Enable Explicit Congestion Notification
No
Enable Fixed Communications
No
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
TeamViewer
Free license (non-commercial use only)
Session list
Pulak15 (735 199 671)
www.teamviewer.com
Type here to search
ENG
IN
2:48 PM
12/31/2020


Activities
TeamViewer
Thu 14:47
QualNet
File Edit View Tools Animation Help
Architect
Analyzer
Packet Tracer
Actions
View
Communicate
Files & Extras
Wired Subnet Properties (Wired Subnet 190.0.1.0)
General
Routing Protocol
Router Properties
ARP
File Statistics
Help
General Properties
Property
Value
2D Icon
hub.png
3D Icon
hub.3ds
Scale Factor for 2D Icon (percent)
100
Scale Factor for 3D Icon (percent)
100
Subnet UUID
SUB1
[-] MAC Protocol
802.3
802.3 Bandwidth
100 Mbps
802.3 Mode
Half-Duplex
802.3 Propagation Delay
2.5
micro-seconds
802.3 Drop Probability
0
Enable Promiscuous Mode
No
Enable LLC
No
[-] Network Protocol
IPv4
IPv4 Network Address
190 . 0 . 1 . 0
IPv4 Subnet Mask
255 . 255 . 255 . 0
IP Fragmentation Unit (bytes)
2048
Enable Explicit Congestion Notification
No
Enable Fixed Communications
No
Find
Apply
OK
Cancel
Add To Batch
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
Toolset
Standard
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
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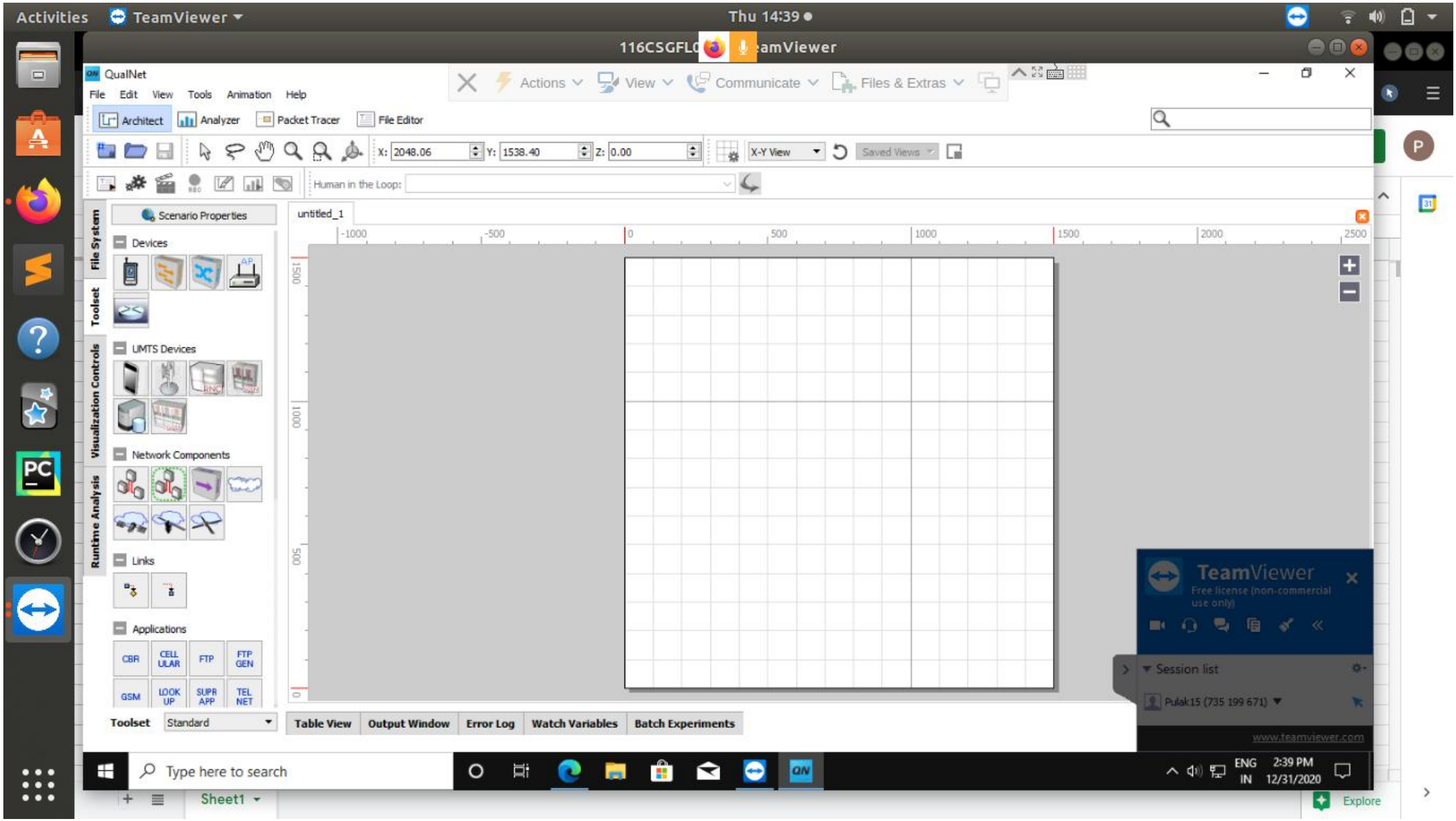
Activities
TeamViewer
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QualNet
File Edit View Tools Animation Help
Actions
View
Communicate
Files & Extras
Architect
Analyzer
Packet Tracer
File Editor
X: 2048.06
Y: 1538.40
Z: 0.00
X-Y View
Saved Views
Human in the Loop:
Scenario Properties
Devices
UMTS Devices
Network Components
Links
Applications
CBR
CELLULAR
FTP
FTP GEN
GSM
LOOKUP
SUPR APP
TELNET
Toolset
Standard
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