Programmation Réseau

API C UDP

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Le mode paquet en C

pour le mode paquet, c'est le type de la socket qui doit être modifié

- `SOCK_DGRAM`

pour les envois, il n'est pas nécessaire de connecter la socket via `connect()`

il s'agit d'ailleurs d'une pseudo-connexion

aucun protocole sous-jacent n'est mis en œuvre...

pour l'émission on dispose des fonctions :

- `send()`, uniquement si la socket est associée à une adresse
- `sendto()` qui est recommandé
- `sendmsg()` pour les messages fragmentés (scattered)

API C UDP

Terminal — less — 80×24

```
SEND(2)                   BSD System Calls Manual                   SEND(2)

NAME
     send, sendmsg, sendto -- send a message from a socket

SYNOPSIS
     #include <sys/socket.h>

     ssize_t
     send(int socket, const void *buffer, size_t length, int flags);

     ssize_t
     sendmsg(int socket, const struct msghdr *message, int flags);

     ssize_t
     sendto(int socket, const void *buffer, size_t length, int flags,
         const struct sockaddr *dest_addr, socklen_t dest_len);

DESCRIPTION
     Send(), sendto(), and sendmsg() are used to transmit a message to another
     socket.  Send() may be used only when the socket is in a connected state
```

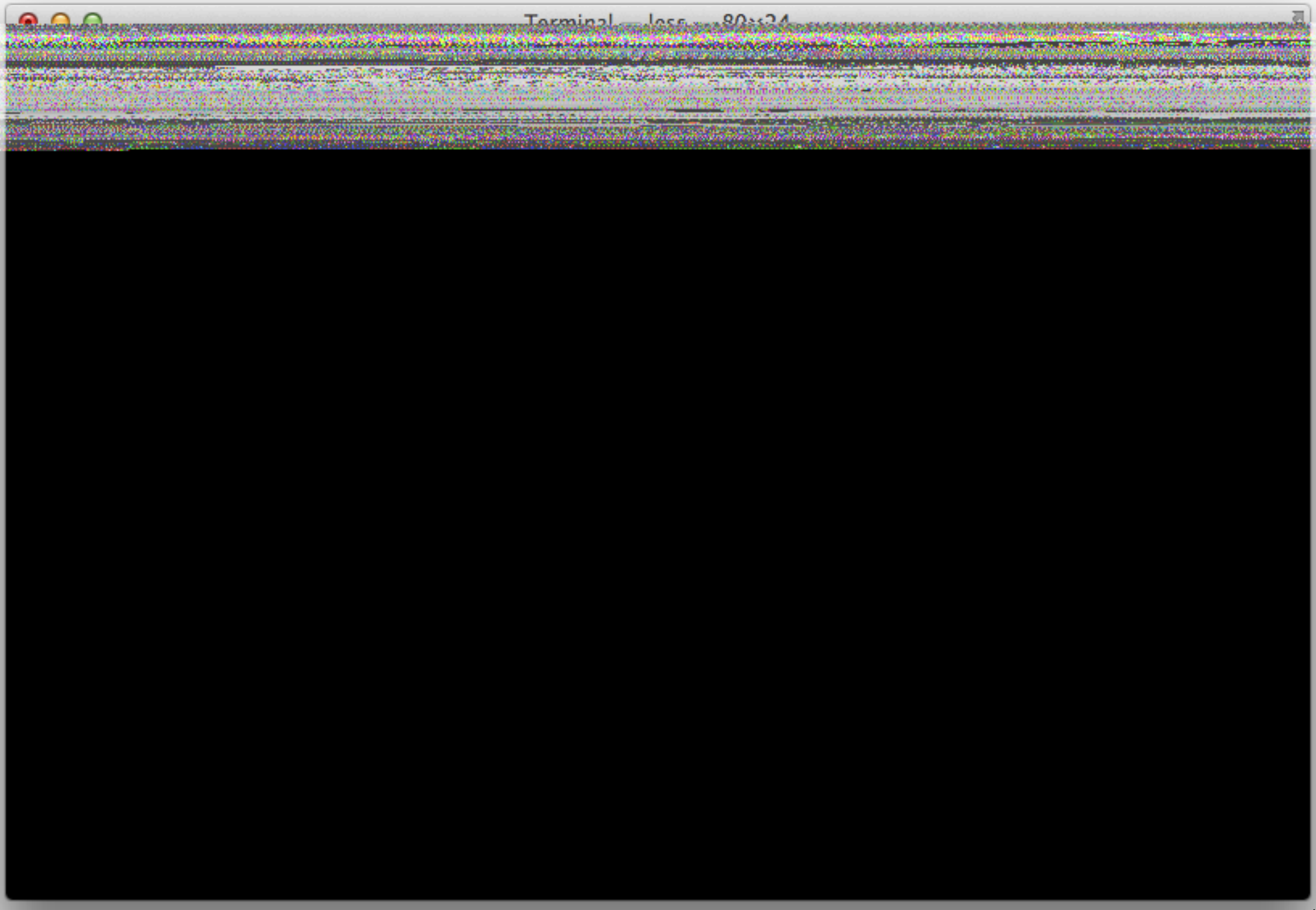
pour la réception on dispose de :

`recv()` pour la réception sur une socket associée à une adresse

`recvfrom()`, recommandé

`recvmsg()` pour les réceptions à défragmenter (gathered)

API C UDP



API C UDP

Client

```
int main(int argc,char *argv[]) {
  struct sockaddr_in addr; int sock; char tampon[256]; struct hostent *hent;

  if (argc<3) {
    fprintf(stderr,"usage: %s host message\n",argv[0]); exit(1);
  }
  hent = gethostbyname(argv[1]);
  if (hent==NULL) {
    fprintf(stderr,"%s: host %s unknown\n",argv[0],argv[1]); exit(1);
  }
  sock = socket(PF_INET,SOCK_DGRAM,0); // Protocol family
  if (sock==-1) {
    perror("socket: "); exit(1);
  }
  addr.sin_family = AF_INET;              // Address family
  addr.sin_port = htons(PORT);
  memcpy(&(addr.sin_addr.s_addr),hent->h_addr_list[0],hent->h_length);
  strcpy(tampon,argv[2]);
  if (sendto(sock,tampon,256,0,(struct sockaddr *)(&addr),sizeof(addr))==-1) {
    perror("sendto:"); close(sock); exit(1);
  }
  close(sock);
  return 0;
}
```

API C UDP

Serveur

```
int main(int argc,char *argv[]) {
  struct sockaddr_in addr; int sock; char tampon[256];

  sock = socket(PF_INET,SOCK_DGRAM,0); // Protocol family
  if (sock==-1) {
    perror("socket: "); exit(1);
  }
  addr.sin_family = AF_INET;           // Address family
  addr.sin_port = htons(PORT);
  addr.sin_addr.s_addr = htonl(INADDR_ANY);
  if (bind(sock,(struct sockaddr *)(&addr),sizeof(addr))==-1) {
    perror("bind: "); close(sock); exit(1);
  }
  while (1) {
    if (recv(sock,tampon,256,0)==-1) {
      perror("recv:"); close(sock); exit(1);
    }
    printf("Recu : %s\n",tampon);
    if (!strcmp(tampon,"quit")) break;
  }
  close(sock);
  return 0;
}
```

Un exemple : echo

L'implémentation d'un service d'écho nécessite

l'association, côté client, à une adresse et un port pour recevoir les réponses

l'utilisation de `recvfrom()`, côté serveur, afin de récupérer l'adresse du client afin de lui renvoyer la réponse

API C UDP

Client

```
int main(int argc,char *argv[]) {
  struct sockaddr_in addrto, addrfrom; int sock; char tampon[256]; struct hostent *hent;

  hent = gethostbyname(argv[1]);
  if (hent==NULL) { fprintf(stderr,"%s: host %s unknown\n",argv[0],argv[1]); exit(1); }
  sock = socket(PF_INET,SOCK_DGRAM,0); // Protocol family
  if (sock==-1) { perror("socket: "); exit(1); }
  addrfrom.sin_family = AF_INET;                // Address family
  addrfrom.sin_port = htons(0);                 // Any port
  addrfrom.sin_addr.s_addr = htonl(INADDR_ANY); // Any address
  if (bind(sock,(struct sockaddr *)(&addrfrom),sizeof(addrfrom))==-1) {
    perror("bind: "); close(sock); exit(1);
  }
  addrto.sin_family = hent->h_addrtype;         // destination from db
  memcpy(&(addrto.sin_addr.s_addr),hent->h_addr_list[0],hent->h_length);
  addrto.sin_port = htons(PORT);                // fixed port
  strcpy(tampon,argv[2]);
  if (sendto(sock,tampon,256,0,(struct sockaddr *)(&addrto),sizeof(addrto))==-1) {
    perror("sendto:"); close(sock); exit(1);
  }
  if (strcmp(tampon,"quit")) {
    if (recv(sock,tampon,256,0)==-1) {
      perror("recv:"); close(sock); exit(1);
    }
    printf("Recu : %s\n",tampon);
  }
  close(sock);
  return 0;
}
```

API C UDP

Serveur

```
int main(int argc,char *argv[]) {
  struct sockaddr_in addr, from; int sock; char tampon[256]; socklen_t lg;

  sock = socket(PF_INET,SOCK_DGRAM,0); // Protocol family
  if (sock==-1) { perror("socket: "); exit(1); }
  addr.sin_family = AF_INET;           // Address family
  addr.sin_port = htons(PORT);
  addr.sin_addr.s_addr = htonl(INADDR_ANY);
  if (bind(sock,(struct sockaddr *)(&addr),sizeof(addr))==-1) {
    perror("bind: "); close(sock); exit(1);
  }
  while (1) {
    lg = sizeof(from);
    if (recvfrom(sock,tampon,256,0,(struct sockaddr *)(&from),&lg)==-1) {
      perror("recv:"); close(sock); exit(1);
    }
    printf("Recu : %s\n",tampon);
    if (!strcmp(tampon,"quit")) break;
    if (sendto(sock,tampon,256,0,(struct sockaddr *)(&from),lg)==-1) {
      perror("sendto:"); close(sock); exit(1);
    }
    printf("Renvoye : %s\n",tampon);
  }
  close(sock);
  return 0;
}
```