Compressions des sessions TCP/IP avec des outils de type SSH

Version française du *Compressed TCP/IP-Sessions using SSH-like tools*

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Ce guide pratique explique pas à pas comment compresser ses connexions en utilisant SSH. Compresser les connexions permet, d'une part, de limiter la bande passante utilisée et, d'autre part, d'accélérer les connexions à faible débit (modem, GSM, RNIS).

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1. Introduction

Dans le passé, nous avions l'habitude de compresser les fichiers pour économiser de l'espace disque. Aujourd'hui, l'espace disque est peu onéreux mais la bande passante est limitée. En compressant les flux de données réseau, vous atteindrez deux objectifs :

1. Vous économiserez la bande passante et le volume transféré (ce qui est important si vous devez payer le trafic ou si votre réseau est chargé).
2. Vous accélérez les connexions à faible bande passante (Modem, GSM, RNIS).

Ce guide va vous expliquer comment économiser la bande passante et le temps de connexion en utilisant des outils comme SSH1, SSH2, OpenSSH ou LSH.

2. Compresser HTTP, FTP…

Mon bureau est connecté à internet par une ligne RNIS à 64 kbit/s. Le taux de transfert maximum de cette ligne est donc d'environ 7 ko/s. Il est possible d'accélérer le débit de cette connexion en compressant les données échangées : quand je télécharge des fichiers, Netscape affiche un taux de transfert allant jusqu'à 40 ko/s (Il est possible de compresser les fichiers d'historique par un facteur de 15). SSH est un outil principalement conçu pour la mise en place de connexions sécurisées au travers de réseaux non-sécurisés. De plus, SSH est capable de compresser les données échangées et de faire suivre des ports (comme le font rinetd ou redir). C'est donc l'outil approprié pour compresser n'importe quelle connexion TCP simple. « Simple » signifie que seule une connexion TCP est ouverte. Une connexion FTP ou la connexion entre les produits Microsoft Outlook et Exchange ne sera pas simple puisque qu'elle impliquera la mise en place de plusieurs connexions. SSH utilise l'algorithme de compression Lempel-Ziv (LZ77) — donc vous atteindrez les mêmes importants taux de compression que winzip et pkzip. Pour compresser toutes les connexions HTTP provenant de mon intranet vers internet, il me suffit d'exécuter une commande sur ma machine :

```
ssh -C -L8080:mandataire:80 -f identifiant@nom_d_hote "sleep 10000"
```

`nom_d_hote` = la machine hébergée par le fournisseur d'accès internet (FAI). Un accès via SSH à cette machine est nécessaire.

`identifiant` = mon nom d'utilisateur sur `nom_d_hote`.

`mandataire` = le serveur mandataire (*proxy*) de mon FAI.

Le navigateur de mon PC est configuré pour utiliser `localhost:8080` comme serveur mandataire (`localhost` étant le nom d'hôte par défaut permettant de se connecter à la machine locale). Mon portable se connecte lui aussi sur le port `8080` de mon PC (en utilisant l'adresse IP de mon PC au lieu de `localhost`). La connexion est compressée et redirigée vers le véritable serveur mandataire via SSH. L'infrastructure ressemble à celle-ci :

```
              64 kbit/s RNIS
Mon PC ------------------------------ Un PC
Client SSH      compressé     (Unix/Linux/Win-NT)
Port 8080                        chez mon FAI
 |                               Serveur SSH
 |                                 Port 22
 |                                    |
 |                                    |
 |                                    |
 |  Ethernet 10 mbit/s                |  100 mbit/s
 |  non compressé                     |  non compressé
 |                                    |
 |                                    |
```

```
Mon second PC                  Serveur mandataire (proxy)
avec Netscape,...                   de mon FAI
(portable)                           Port 80
```

3. Compression du courrier électronique

3.1. Courrier entrant (POP3, IMAP4)

La plupart des internautes rapatrient leur courrier électronique à partir de leur serveur de messagerie via le protocole POP3. Ce protocole présente de nombreux inconvénients :

1. POP3 fait transiter le mot de passe en clair (des versions de POP et d'IMAP utilisant SSL ont été développées et un mécanisme d'authentification via un protocole de type défi-réponse est défini dans les RFC 2095 et 2195).

2. POP3 est un protocole très bavard : le client doit tout d'abord demander un message. Puis le serveur lui envoie le message. Ensuite, le client demande la suppression du message transféré. Le serveur lui confirme la suppression. Une fois cela fait, le serveur est prêt à passer au message suivant. Cela nécessite donc 4 transactions par courrier électronique.

3. POP3 transfère les courriers électroniques sans aucune compression, bien que les courriers électroniques soient hautement compressible (d'un facteur de 3,5).

Vous pourriez compresser les connexions POP3 en redirigeant le port 110 de la machine locale (`localhost:110`) via une connexion compressée vers le serveur POP3 de votre fournisseur d'accès. Après cela, il suffirait de configurer votre client de messagerie pour qu'il se connecte sur l'adresse `localhost:110` afin de télécharger le courrier électronique. Ce qui permettrait de sécuriser et d'accélérer la connexion — mais le temps de téléchargement reste inhérent à la surcharge due au protocole POP3.

Il est intéressant de substituer au protocole POP3 un protocole plus efficace. L'idée est de télécharger la boîte aux lettres toute entière en une seule fois sans avoir à supporter la surcharge due au protocole. De plus, il est intéressant de compresser cette connexion. L'outil approprié offrant ces deux caractéristiques est SCP. Vous pouvez télécharger votre fichier boîte aux lettres de la manière suivante :

```
scp -C identifiant@serveur-de-messagerie:/var/spool/mail/identifiant \
       /tmp/nouveau_courrier
```

Mais il y a un problème : que se passe-t-il si un nouveau courrier arrive sur le serveur pendant que vous téléchargez votre boîte aux lettres ? Le nouveau courrier serait perdu. On a plutôt intérêt à utiliser les commandes suivantes :

```
ssh identifiant@serveur-de-messagerie \
    "mv /var/spool/mail/identifiant /tmp/identifiant_a_rapatrier"
scp -C identifiant@serveur-de-messagerie:/tmp/identifiant_a_rapatrier \
       /tmp/nouveau_courrier
```

Un déplacement de fichier (mv) est une opération élémentaire, donc vous n'aurez pas de problème si vous recevez de nouveaux courriers durant l'exécution des commandes. Cependant si les répertoires /tmp et /var/spool/mail/ du serveur de messagerie ne sont pas sur le même disque, vous pourriez avoir des problèmes. Une solution est de créer un fichier de verrouillage sur le serveur avant d'exécuter la commande de déplacement :

```
touch /var/spool/mail/identifiant.lock
```

Vous devrez le supprimer après coup. Une meilleure solution est de déplacer le fichier identifiant dans le même répertoire :

```
ssh identifiant@serveur-de-messagerie \
    "mv /var/spool/mail/identifiant /var/spool/mail/identifiant_a_rapatrier"
```

Après cela, vous pourrez utiliser formail à la place de procmail pour filtrer /tmp/nouveau_courrier dans les répertoires correspondants :

```
formail -s procmail < /tmp/nouveau_courrier
```

3.2. Courrier sortant (SMTP)

Envoyez des courriers électroniques au travers de connexions SSH compressées et chiffrées, permet de :

- Économiser du trafic réseau.
- Sécuriser la connexion (cela n'a pas d'intérêt si le courrier électronique transite par des réseaux non sécurisés par la suite).
- Authentifier l'émetteur. Beaucoup de serveurs de messagerie n'autorisent pas le transit des courriers pour éviter les abus. Si vous envoyez un courrier au travers d'une connexion SSH, le serveur de messagerie distant (par exemple Sendmail ou MS Exchange) pensera être connecté localement, et acceptera donc de faire transiter le message.

Si vous avez un accès SSH au serveur de messagerie, vous aurez besoin de la commande suivante :

```
ssh -C -L2525:serveur_de_messagerie:25 identifiant@serveur_de_messagerie
```

Si vous n'avez pas d'accès SSH au serveur de messagerie, mais que vous avez un accès SSH à un serveur autorisé à utiliser le serveur de messagerie comme relais, la commande sera la suivante :

```
ssh -C -L2525:serveur_de_messagerie:25 identifiant@autre_server
```

Après cela, vous pourrez configurer votre client de messagerie local (ou le serveur de messagerie, recherchez de la documentation sur les relais de messagerie (*smarthosts*)) pour envoyer les messages sortants vers le port 2525 de la machine locale (`localhost`).

4. Notes sur les performances

Bien sûr, la compression et le chiffrement utilisent du temps processeur. Il a été calculé qu'un vieux Pentium-133 peut chiffrer et compresser environ 1 Go / heure — ce qui est assez important. Si vous compilez SSH avec l'option « --with-none » vous indiquerez à SSH de ne pas utiliser de chiffrement. Cela permet d'augmenter un peu les performances. Voici une évaluation de

le compromis entre différentes méthodes de téléchargement (pendant le test, un fichier non compressé de 6 Mo est transféré à partir d'un Pentium à 133 MHz vers un portable équipé d'un Pentium 2 à 233 MHz et ceci sur un segment Ethernet à 10 Mbit/s sans autre charge).

	FTP	chiffré	compressé	compressé & chiffré
Temps écoulé (s)	7.6	26	9	23
Taux de transfert (ko/s)	790	232	320	264
Facteur compression	1	1	3.8	3.8

5. Remerciements

Merci à Harald König <koenig CHEZ tat POINT physik POINT uni TIRET tuebingen POINT de>, qui a utilisé rcp pour télécharger les boîtes aux lettres complètes. La dernière version de ce guide pratique en version originale est disponible à l'adresse suivante : http://www.tldp.org/HOWTO/Compressed-TCP.html.

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