

Travaux Dirigés N°3

Les réseaux d'accès : DSL - Les Protocoles

Exercice N°1

On donne l'écran de configuration WAN principal d'une box (modem/routeur) .

- Quel est le protocole de liaison est-il utilisé sur la modulation DSL (ATM ou Ethernet) ?
- Quel protocole permet au modem/routeur d'obtenir ses identifiants de connexion (@IP publique, DNS...).
- Quelle protocole sécurise l'authentification du client sur la ligne, expliquez son mécanisme.

PPPoE / PPPoA Client Mode

PPPoE/PPPoA Client ☒ Enable ☐ Disable

DSL Modem Settings (for ADSL mode only)

Multi-PVC channel: Channel 1

VPI: 8

VCI: 40

Encapsulating Type: LLC/SNAP

Protocol: PPPoE

Modulation: Multimode

PPPoE Pass-through

☐ For Wired LAN²

WAN Connection Detection

Mode: ARP Detect

Ping IP:

TTL:

MTU: 1492 (Max:1500)

ISP Access Setup

Service Name¹:

Username: Tintin68

Password: *****

PPP Authentication: PAP or CHAP

IP Address From ISP: WAN IP Alias

Fixed IP ☐ Yes ☒ No (Dynamic IP)

Fixed IP Address:

☒ Default MAC Address

☐ Specify a MAC Address

MAC Address: 00 1D AA 8D 3F A1

Index(1-15) in Schedule Setup: => , , , , ,

Exercice N°2

On donne l'écran de configuration WAN principal d'un modem/routeur de marque Draytek .

PPPoE / PPPoA Client Mode

PPPoE/PPPoA Client ☐ Enable ☒ Disable

WAN 1

Enable: Yes

Display Name:

Physical Mode: VDSL2

DSL Mode: Auto

DSL Modem Code: Default

Line Speed(Kbps):

DownLink: 0

UpLink: 0

VLAN Tag insertion (ADSL): Disable

Tag value: 0 (0~4095)

Priority: 0 (0~7)

VLAN Tag insertion (VDSL2): Enable

Tag value: 836 (0~4095)

Priority: 0 (0~7)

Active Mode: Always On Load Balance: ☒

WAN IP Network Settings

☒ Obtain an IP address automatically

Router Name:

Domain Name:

☐ DHCP Client Identifier

Username:

Password:

☒ Specify an IP address WAN IP Alias

IP Address:

Subnet Mask:

Gateway IP Address:

☐ Default MAC Address

☒ Specify a MAC Address

MAC Address: 00 07 CB FF B1 22

DNS Server IP Address

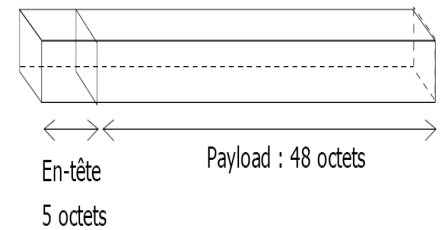
Primary IP Address: 212.27.40.240

Secondary IP Address: 212.27.40.241

- Ce modem/routeur est il synchronisé sur un lien Adsl ou Vdsl ?
- Quel est le protocole de transport utilisé sur la modulation DSL (ATM ou Ethernet) ?
- Quel protocole permet au modem d'obtenir son @IP publique ?
- D'après vous, que cherche a faire le propriétaire de ce modem ?

Exercice N°3

Dans un transport de trames de type ATM, les trames Ethernet sont encapsulées dans des « cellule » de 48 Octets auquel on ajoute 5 Octets d'entête par cellules.



Les fournisseurs d'accès ont tendance à annoncer au client le débit « ATM », c'est-à-dire le débit numérique global, incluant les en-têtes ATM.

- Calculer le pourcentage que représentent les données utiles au client par rapport au données totales reçu par celui-ci.
- Le fournisseur d'accès indique un débit « ATM » Downlink de 20 Mbits/s. Cela représente quel débit réel pour le client ?

Exercice N°4

1 - Les deux copies d'écrans suivantes ont été faites sur une liveBox Orange. Expliquez les différents paramètres.

Livebox interface showing system information for the Internet connection. The page is in French. The left sidebar contains links like 'état des voyants', 'informations système', 'sauvegarder ma configuration', etc. The main content area is titled 'informations système' and has tabs for 'général', 'DSL', 'Internet', 'WiFi', 'LAN', 'VoIP', 'USB', and 'TV'. The 'Internet' tab is selected, showing the following details:

3.1	statut de la connexion Internet	connecté
3.2	nom d'utilisateur	fttc3
3.3	dernière connexion	24 juillet 2014, 10 h 54 m
3.4	durée de la connexion	00 j 02 h 10 m 58 s
3.5	type du protocole	ppp
3.6	code d'erreur de la dernière connexion	ERROR_NONE
3.7	date de la dernière connexion	1492
3.8	ATM VP/VC ou VLAN	8/35
3.9	taille MTU	1492
3.10	adresse IPv4 WAN	92.136.234.36
3.12	adresse IP du DNSv4 primaire	81.253.149.2
3.13	adresse IP du DNSv4 secondaire	80.10.246.132

Livebox interface showing system information for the VoIP connection. The page is in French. The left sidebar is the same as the previous screenshot. The main content area is titled 'informations système' and has tabs for 'général', 'DSL', 'Internet', 'WiFi', 'LAN', 'VoIP', 'USB', and 'TV'. The 'VoIP' tab is selected, showing the following details:

6.1	état	actif
6.2 <td>numéro téléphonique VoIP</td> <td>09626</td>	numéro téléphonique VoIP	09626
6.3 <td>ATM VP/VC ou VLAN</td> <td>8/51</td>	ATM VP/VC ou VLAN	8/51
6.4 <td>protocole</td> <td>SIP</td>	protocole	SIP

2 - Quel différence faite vous avec la copie d'écran suivante effectuée chez un autre client :

mon réseaumon WiFimon téléphoneassistanceconfiguration avancée

état des voyants

informations système

sauvegarder ma configuration

restaurer ma configuration

redémarrer

ré-initialiser

mise à jour du logiciel de la Livebox

ma Livebox

assistance > Informations système > Internet

informations système

généralDSLInternetWiFiLANVoIPUSBTV

3.1 statut de la connexion Internetconnecté

3.2 nom d'utilisateurN/A

3.3 dernière connexion2 mai 2017, 18 h 58 m

3.4 durée de la connexion09 j 20 h 00 m 41 s

3.5 type du protocoldhcp

3.6 code d'erreur de la dernière connexionNone

3.7 date de la dernière connexion0

3.8 ATM VP/VC ou VLAN832

3.9 taille MTU

3.10 adresse IPv4 WAN81.249.222.252

3.12 adresse IP du DNSv4 primaire81.253.149.1

3.13 adresse IP du DNSv4 secondaire80.10.246.130

Exercice N°5

Les trames suivantes sont issues d'un relevé WireShark effectué sur un port Ethernet d'un équipement d'un réseau Adsl.

- 1) Identifiez les équipements concernés par cet échange ?
- 2) Quel est l'objet principal de ces trames et quels sont les protocoles mis en œuvre ?
- 3) La trame II est-elle antérieur ou postérieur à la trame I ?

```
Frame 174: 26 bytes on wire (208 bits), 26 bytes captured (208 bits) on interface 0
Ethernet II, Src: Intel_5c:de:c6 (00:07:e9:5c:de:c6), Dst: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
  Destination: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Source: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Type: PPPoE Session (0x8864)
  PPP-over-Ethernet Session
    0001 .... = Version: 1
    .... 0001 = Type: 1
    Code: Session Data (0x00)
    Session ID: 0x0003
    Payload Length: 6
  Point-to-Point Protocol
    Protocol: Challenge Handshake Authentication Protocol (0xc223)
  PPP Challenge Handshake Authentication Protocol
    Code: Success (3)
    Identifier: 0
    Length: 4

Frame 173: 80 bytes on wire (640 bits), 80 bytes captured (640 bits) on interface 0
Ethernet II, Src: ZygateCo_ae:47:16 (00:02:cf:ae:47:16), Dst: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
  Destination: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Source: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Type: PPPoE Session (0x8864)
  PPP-over-Ethernet Session
    0001 .... = Version: 1
    .... 0001 = Type: 1
    Code: Session Data (0x00)
    Session ID: 0x0003
    Payload Length: 60
  Point-to-Point Protocol
    Protocol: Challenge Handshake Authentication Protocol (0xc223)
  PPP Challenge Handshake Authentication Protocol
    Code: Response (2)
    Identifier: 0
    Length: 58
  Data
    Value Size: 49
    Value: cc7e79b66e58e2502bdbc8db0f88c6df752fa7549dcc6ff7...
    Name: voip
```

Exercice N°6

Les trames suivantes sont issues d'un relevé WireShark effectué sur un port Ethernet d'un serveur PPPOE. Elles sont volontairement dans le désordre.

Remettre les trames dans l'ordre chronologique avec un minimum d'explication.

1

```
1  Frame 170: 41 bytes on wire (328 bits), 41 bytes captured (328 bits) on interface 0
2  Ethernet II, Src: Intel_5c:de:c6 (00:07:e9:5c:de:c6), Dst: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Request (1)
8  Identifier: 2 (0x02)
9  Length: 19
10 Options: (15 bytes), Maximum Receive Unit, Authentication Protocol, Magic Number
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
16     Type: Authentication Protocol (3)
17     Length: 5
18     Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
19     Algorithm: MS-CHAP (128)
20   Magic Number: 0x5ce906c3
21     Type: Magic Number (5)
22     Length: 6
23     Magic Number: 0x5ce906c3
```

2

```
1  Frame 171: 36 bytes on wire (288 bits), 36 bytes captured (288 bits) on interface 0
2  Ethernet II, Src: Intel_5c:de:c6 (00:07:e9:5c:de:c6), Dst: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Ack (2)
8  Identifier: 0 (0x00)
9  Length: 14
10 Options: (10 bytes), Maximum Receive Unit, Magic Number
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Magic Number: 0x000048ad
16     Type: Magic Number (5)
17     Length: 6
```

3

```
1  Frame 172: 41 bytes on wire (328 bits), 41 bytes captured (328 bits) on interface 0
2  Ethernet II, Src: Intel_5c:de:c6 (00:07:e9:5c:de:c6), Dst: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Request (1)
8  Identifier: 1 (0x01)
9  Length: 19
10 Options: (15 bytes), Maximum Receive Unit, Authentication Protocol, Magic Number
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
16     Type: Authentication Protocol (3)
17     Length: 5
18     Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
19     Algorithm: MS-CHAP-2 (129)
20   Magic Number: 0x5ce906c3
21     Type: Magic Number (5)
22     Length: 6
23     Magic Number: 0x5ce906c3
```

4

```
1  Frame 173: 75 bytes on wire (600 bits), 75 bytes captured (600 bits) on interface 0
2  Ethernet II, Src: Intel_5c:de:c6 (00:07:e9:5c:de:c6), Dst: ZygateCo_ae:47:16 (00:02:cf:ae:47:16)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Request (1)
8  Identifier: 0 (0x00)
9  Length: 53
10 Options: (49 bytes), Maximum Receive Unit, Authentication Protocol, Magic Number, Callback, Multilink MRU
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
16     Type: Authentication Protocol (3)
17     Length: 5
18     Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
19     Algorithm: MS-CHAP-2 (129)
20   Magic Number: 0x5ce906c3
21     Type: Magic Number (5)
22     Length: 6
23     Magic Number: 0x5ce906c3
24   Callback: Location is determined during CBCP negotiation
25   Multilink MRU: 1614
26   Multilink Endpoint Discriminator: Class: Locally assigned address
27   Link Discriminator for BACP: 0 (0x0000)
```

5

```
1  Frame 171: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
2  Ethernet II, Src: ZygateCo_ae:47:16 (00:02:cf:ae:47:16), Dst: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Ack (2)
8  Identifier: 2 (0x02)
9  Length: 19
10 Options: (15 bytes), Maximum Receive Unit, Authentication Protocol, Magic Number
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
16     Type: Authentication Protocol (3)
17     Length: 5
18     Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
19     Algorithm: MS-CHAP (128)
20   Magic Number: 0x5ce906c3
21     Type: Magic Number (5)
22     Length: 6
23     Magic Number: 0x5ce906c3
```

6

```
1  Frame 172: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
2  Ethernet II, Src: ZygateCo_ae:47:16 (00:02:cf:ae:47:16), Dst: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Reject (4)
8  Identifier: 0 (0x00)
9  Length: 38
10 Options: (34 bytes), Callback, Multilink MRU, Multilink Endpoint Discriminator, Link Discriminator
11   Callback: Location is determined during CBCP negotiation
12   Multilink MRU: 1614
13   Multilink Endpoint Discriminator: Class: Locally assigned address
14   Link Discriminator for BACP: 0 (0x0000)
```

7

```
1  Frame 173: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
2  Ethernet II, Src: ZygateCo_ae:47:16 (00:02:cf:ae:47:16), Dst: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Nak (3)
8  Identifier: 1 (0x01)
9  Length: 9
10 Options: (5 bytes), Authentication Protocol
11   Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
12     Type: Authentication Protocol (3)
13     Length: 5
14     Authentication Protocol: Challenge Handshake Authentication Protocol (0xc223)
15     Algorithm: CHAP with MD5 (5)
```

8

```
1  Frame 174: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
2  Ethernet II, Src: ZygateCo_ae:47:16 (00:02:cf:ae:47:16), Dst: Intel_5c:de:c6 (00:07:e9:5c:de:c6)
3  PPP-over-Ethernet Session
4  Point-to-Point Protocol
5  Protocol: Link Control Protocol (0xc021)
6  PPP Link Control Protocol
7  Code: Configuration Request (1)
8  Identifier: 0 (0x00)
9  Length: 14
10 Options: (10 bytes), Maximum Receive Unit, Magic Number
11   Maximum Receive Unit: 1492
12     Type: Maximum Receive Unit (1)
13     Length: 4
14     Maximum Receive Unit: 1492
15   Magic Number: 0x000048ad
16     Type: Magic Number (5)
17     Length: 6
18     Magic Number: 0x000048ad
```