



INTERNATIONAL TELECOMMUNICATION UNION

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**Y.120**

**Annex A**  
(02/99)

SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE  
General

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Global information infrastructure scenario  
methodology

**Annex A: Examples of use**

ITU-T Recommendation Y.120 – Annex A

(Previously CCITT Recommendation)

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ITU-T Y-SERIES RECOMMENDATIONS  
GLOBAL INFORMATION INFRASTRUCTURE

<b>General</b>	<b>Y.100–Y.199</b>
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799

*For further details, please refer to ITU-T List of Recommendations.*

# **ITU-T RECOMMENDATION Y.120**

## **GLOBAL INFORMATION INFRASTRUCTURE SCENARIO METHODOLOGY**

### **ANNEX A**

#### **Examples of use**

##### **Summary**

This Annex presents scenario examples, based on the methodology described in Recommendation Y.120, primarily oriented towards provision of voice, data and video services.

##### **Source**

Annex A to ITU-T Recommendation Y.120, was prepared by ITU-T Study Group 13 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 15<sup>th</sup> of February 1999.

## FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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## CONTENTS

	<b>Page</b>
Annex A – Examples of use .....	1
A.1 Purpose of the scenarios .....	1
A.2 Abbreviations .....	1
A.3 Reference model.....	2
A.4 Components.....	3
A.5 Interface points .....	3
A.6 The scenarios.....	3
A.7 Scenario 1 – Provision of voice/data/video service over existing infrastructure .....	4
A.8 Scenario 2 – Provision of voice/data/video services over cable networks using B-ISDN.....	8
A.9 Scenario 3 – The use of ADSL or VDSL to provide video bandwidth over copper pairs .....	11
A.10 Scenario 4 – Fibre access scenario .....	13
A.11 Scenario 5 – The use of radio in the local loop .....	15
A.12 Scenario 6 – Access using satellites .....	17
A.13 Scenario 7 – Example of Internet access.....	19
A.14 Summary of scenarios .....	22



## Recommendation Y.120

# GLOBAL INFORMATION INFRASTRUCTURE SCENARIO METHODOLOGY

## ANNEX A

### Examples of use

*(Geneva, 1999)*

#### A.1 Purpose of the scenarios

The scenarios are intended to:

- a) facilitate the identification of key interface points in a scenario;
- b) facilitate classification of interfaces by an appropriate taxonomy scheme;
- c) facilitate identification of services that can be carried across such interfaces;
- d) facilitate classification of services by an appropriate taxonomy scheme;
- e) facilitate identification of end points for service delivery;
- f) facilitate investigation of interplay between all components;
- g) accommodate the protocols involved, either directly or indirectly, at a given interface;
- h) be generic enough to facilitate scenario development across all technologies and standards development organizations areas.

The scenario technique is also applicable to application requirements as well as network requirements.

An interface occurs between any point where two components need to communicate.

Application requirements can be included in the scenarios.

The scenarios currently contained in this Annex are primarily oriented towards provision of voice, data and video services. Example scenarios to meet other applications requirements, such as transaction processing, distributed computing, imaging etc. need to be similarly developed.

NOTE 1 – The set of examples contained within this Annex is not intended to be exhaustive.

NOTE 2 – Other physical implementations may be equally valid.

#### A.2 Abbreviations

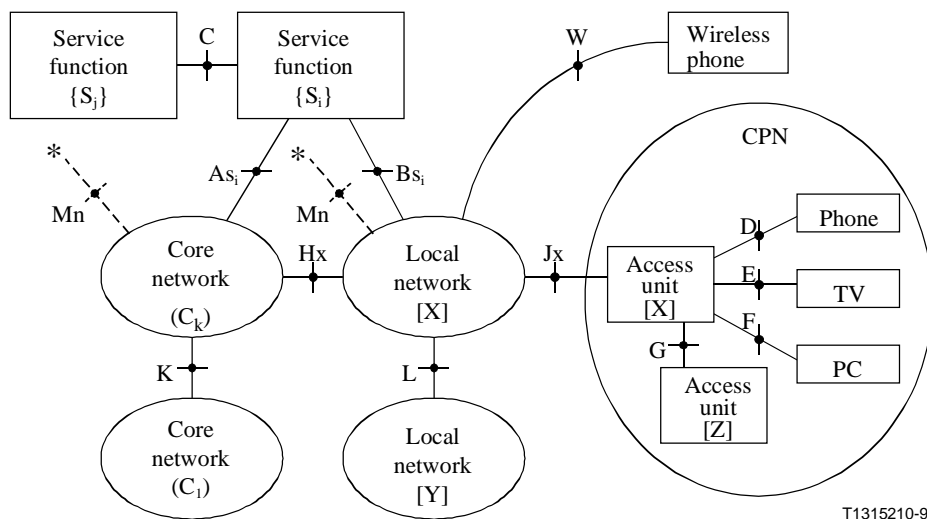
Further to the abbreviations given in Recommendation Y.120, the following are additional in this Annex.

ADSL	Asymmetric Digital Subscriber Line
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
BS	Base Station
CATV	Cable Television
CPN	Customer Premises Network
DSB	Digital Satellite Broadcast

FR	Frame Relay
FTTB	Fibre to the Building
FTTC	Fibre to the Curb
FTTH	Fibre to the Home
HDSL	High bit rate Digital Subscriber Line
HFC	Hybrid Fibre Coax
INI	Inter-Network Interface
IP	Internet Protocol
ISDN	Integrated Services Digital Network
LAN	Local Area Network
N-ISDN	Narrow-band ISDN
OAM	Operation Administration and Maintenance
PBX	Private Branch eXchange
PON	Passive Optical Network
POTS	Plain Old Telephone Service
RITL	Radio In The Loop
UNI	User Network Interface
VDSL	Very high speed Digital Subscriber Line
WLL	Wireless Local Loop

### A.3 Reference model

See Figure A.0.



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\* To management network

**Figure A.0/Y.120 – Reference model**



#### **A.4 Components**

- Service function: such as video server and video service provider for video service, and IP router and point of presence for Internet service.
  - Core network: such as telecommunication network, PSTN, N-ISDN, B-ISDN.
  - Local network: such as CATV network, ADSL/VDSL, fibre network, RITL, satellite and including access networks as described in Recommendation Y.120.
  - Customer Premises Network (CPN): such as access unit, TV, PC, phone, wireless phone.
- $\{S_i, S_j^*\}$  means the kind of services.  
 $(C_k, C_l^*)$  means the technology of core network.  
 $[X, Y^*]$  means the technology of local network (access technology).

#### **A.5 Interface points**

- As Between service function and core network (s: kind of service).  
Bs Between service function and local network (s: kind of service).  
C Between service functions.  
W Terminal interface for wireless phone.  
D Terminal interface for phone.  
E Terminal interface for TV.  
F Terminal interface for PC.  
G Between access units.  
Hx Between core network and local network (x: kind of access technology).  
Jx Between local network and CPN (x: kind of access technology).  
K Between core networks.  
L Between local networks.  
Mn Between core/local network and management network (n: kind of network).

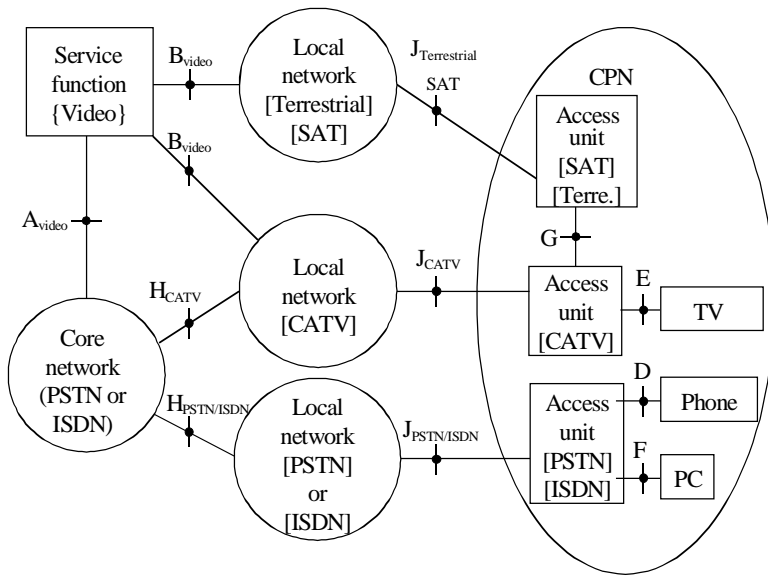
#### **A.6 The scenarios**

- 1) Provision of voice/data/video service over existing infrastructure.
- 2) Provision of voice/data/video services over cable networks using B-ISDN.
- 3) The use of ADSL or VDSL to provide video bandwidth over copper pairs.
- 4) Fibre access scenario.
- 5) The use of radio in the local loop.
- 6) Access using satellites.
- 7) Example of Internet access.

The scenarios, shown in Figures A.1 a) to A.7 b), highlight a significant number of standards related issues and questions.

## A.7 Scenario 1 – Provision of voice/data/video service over existing infrastructure

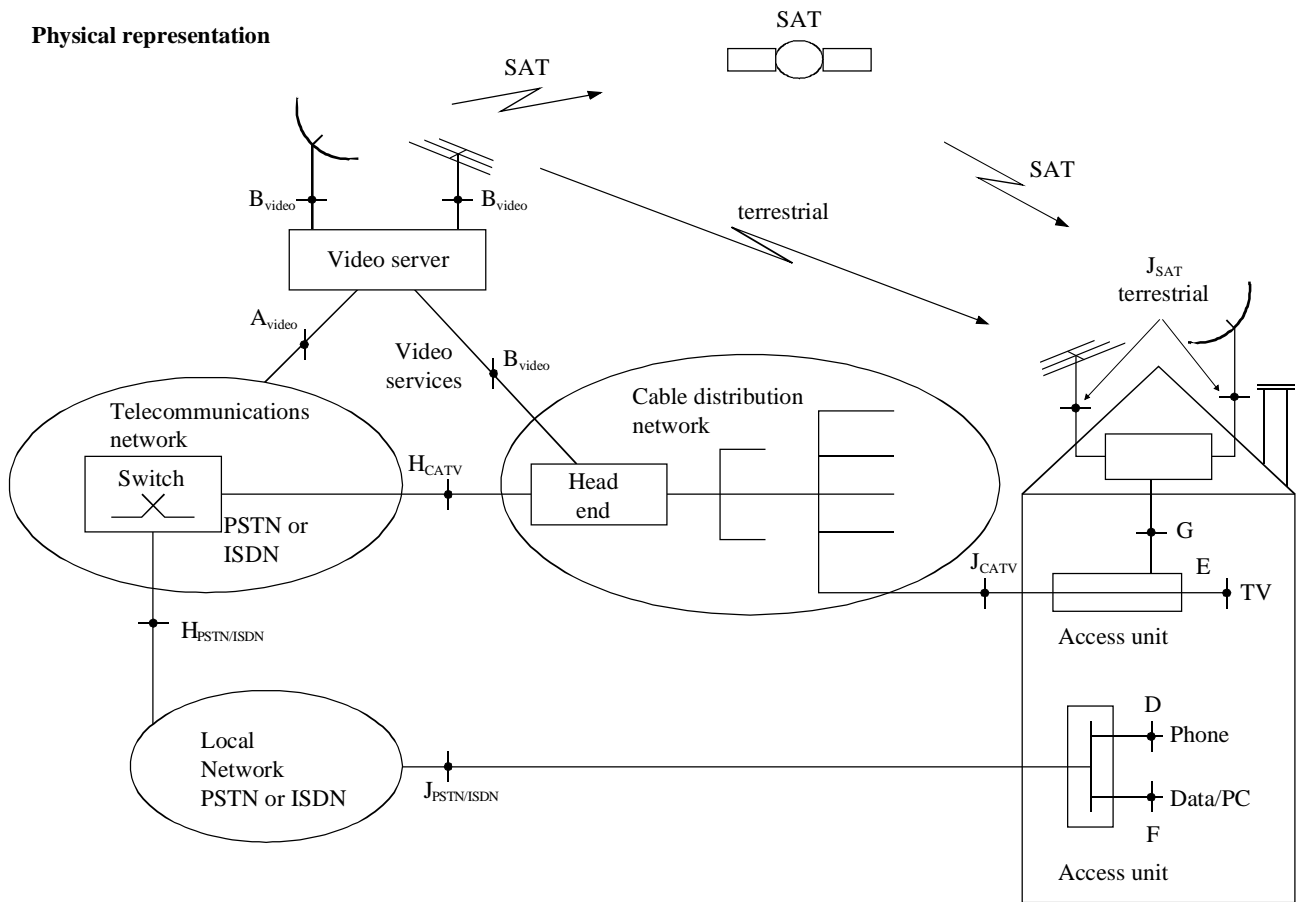
### Logical representation



### Components

- Service function: Video service provider
- Core network: PSTN or ISDN
- Local network: Cable distribution network, SAT
- Local network for PSTN or ISDN is needed
- CPN: TV, PC, Tel terminal, access unit for PSTN or ISDN, CATV, SAT

### Physical representation



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Figure A.1 a)/Y.120 – Provision of voice/data/video services over existing infrastructure

## Key to interfaces

$A_{\text{video}}$	Video service provider to PSTN/ISDN network interface;
$B_{\text{video}}$	Satellite network to cable distribution network Inter-Network interface (INI);
$H_{\text{CATV}}$	PSTN/ISDN cable distribution network INI;
$H_{\text{PSTN/ISDN}}$	PSTN/ISDN core network to local network INI;
$J_{\text{CATV}}$	Cable distribution network interface;
$J_{\text{PSTN/ISDN}}$	PSTN/ISDN local network to access unit UNI.

In the case of ISDN in Figure A.1 a), the voice and data services from a telecommunication operator are extended to the user via a cable network. Questions that arise from this scenario include whether Basic Rate Interface (BRI)/Primary Rate Interface (PRI) or Signalling System No. 7 could be used at the interface point labelled  $H_{\text{CATV}}$  and the resulting implications for interface at points  $J_{\text{CATV}}$ , D and F. Interface  $H_{\text{CATV}}$  may use BRI or PRI.

### Flow information for Figure A.1 a)

In Figure A.1 a) the downstream channel for delivery of video is achieved from the video server to the customer premise either:

- directly via the satellite or terrestrial broadcast facilities; or
- via the  $B_{\text{video}}$  interface between the video server and the head end of the cable distribution network one-way.

Upstream information required for interactive video services is achieved from D or F in the customer premise (depending on whether the phone or PC is used) either:

- via  $J_{\text{PSTN/ISDN}}$  and  $H_{\text{CATV}}$ ; or
- via  $J_{\text{PSTN/ISDN}}$  and  $A_{\text{video}}$ .

### Flow information for Figure A.1 b)

The primary purpose of this figure is to illustrate that the upstream information for interactive video services is achieved via the two-way cable distribution network from  $J_{\text{CATV}}$  to the head end. Additionally the normal two-way phone and data service are also achieved over the cable distribution network via the  $H_{\text{CATV}}$  interface to the telecommunications network.

However, in the case where broadcast facilities are also available as in Figure A.1 a), downstream information could be provided by these broadcast facilities with upstream via the cable distribution network. The head end may include switching, in which case Signalling System No. 7 may also be a candidate for control/signalling transported on the appropriate transmission system. This area is for further study.

The main object of standardization activity in scenarios 1 and 2 may be focused on clarifying the functional requirements of the head end system as a generic access node of GII and specifying the interface between the core network and the head end system, studying the ATM over HFC system.

### Network management interfaces

Management interfaces are shown in Figure A.1 b) as an example. Such interfaces could be shown in other scenarios. The designations M1 etc. are based on ATM forum terminology.

**Mx interface**

Mx is needed for the OAM information flows between CATV head end and the exchange of the N-ISDN/PSTN. The Mx interface may be regarded as part of the  $H_{\text{CATV}}$  interface. The details of the Mx interface are for further study.

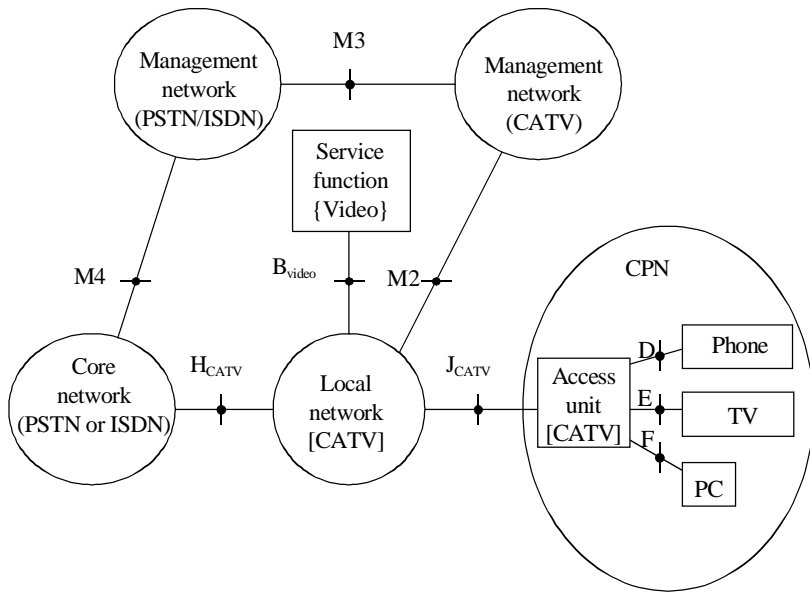
**M2 interface**

The M2 interface is required between the CATV head end and the Operations System (OS) of the CATV network. The Q3 interface may be a candidate for the M2 interface.

**M3 interface**

The M3 interface is required between the two OSs of the N-ISDN/PSTN and the CATV network. In the case where the CATV and N-ISDN/PSTN networks, then the Q3 interface may be applied. If the two networks belong to different operators then the X interface can be a candidate for the M3 interface.

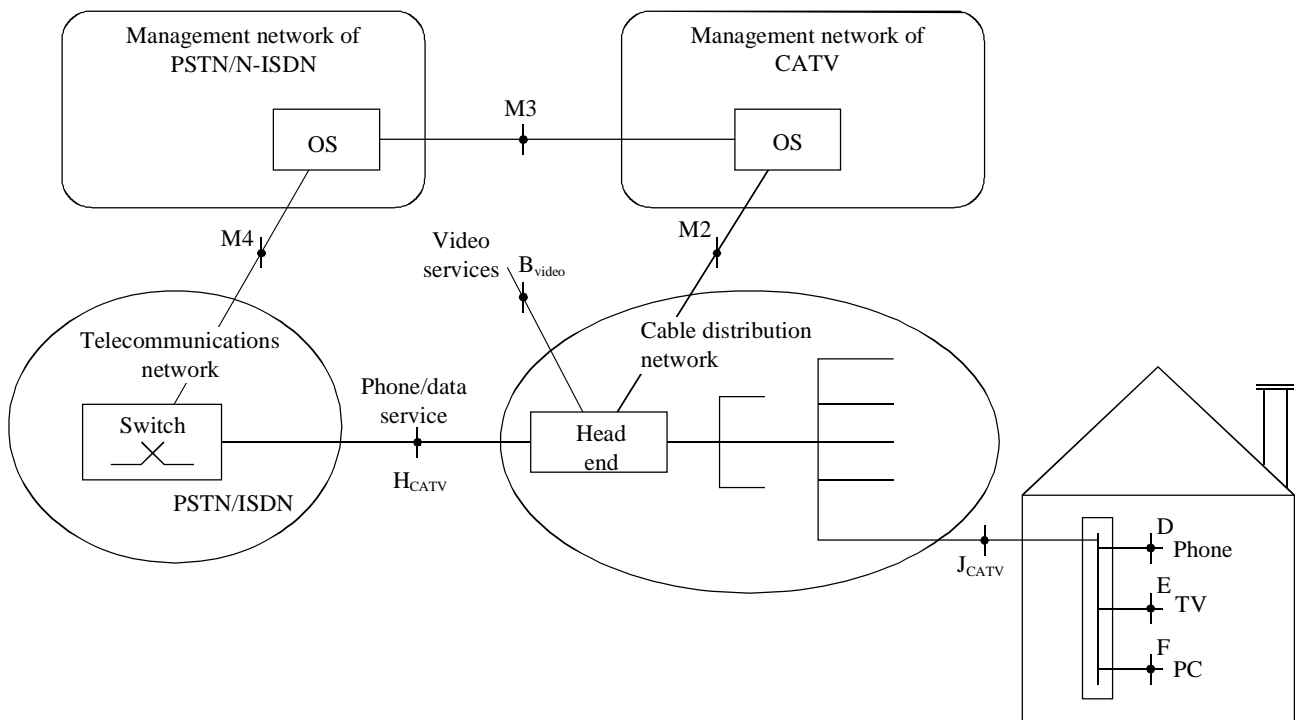
**Logical representation**



**Components**

- Service function: Video service provider
- Core network: PSTN or ISDN
- Local network: Cable distribution network
- CPN: TV, PC, Tel terminal, access unit for CATV

**Physical representation**



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**Figure A.1 b)/Y.120 – Provision of voice/data service over two-way cable networks using PSTN or ISDN with network management interfaces**

## **A.8 Scenario 2 – Provision of voice/data/video services over cable networks using B-ISDN**

### **Flow information for Figure A.2 a)**

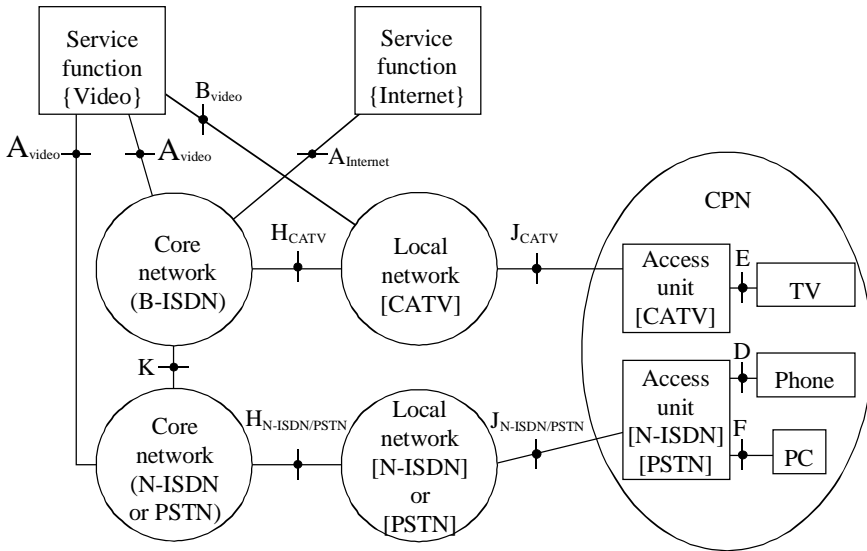
Video services can be delivered to the customer's premise:

- a) from  $B_{\text{video}}$  via  $J_{\text{CATV}}$ ; or
- b) from the video servers via  $H_{\text{CATV}}$  to the head end and then via  $J_{\text{CATV}}$ ;

Control information for video services may be exchanged:

- a) via  $J_{\text{N-ISDN/PSTN}}$  and  $A_{\text{video}}$  to the video server and/or head end via  $H_{\text{CATV}}$ ;
- b) via  $J_{\text{N-ISDN/PSTN}}$  and  $K$  to the video server, and/or head end via  $H_{\text{CATV}}$ .

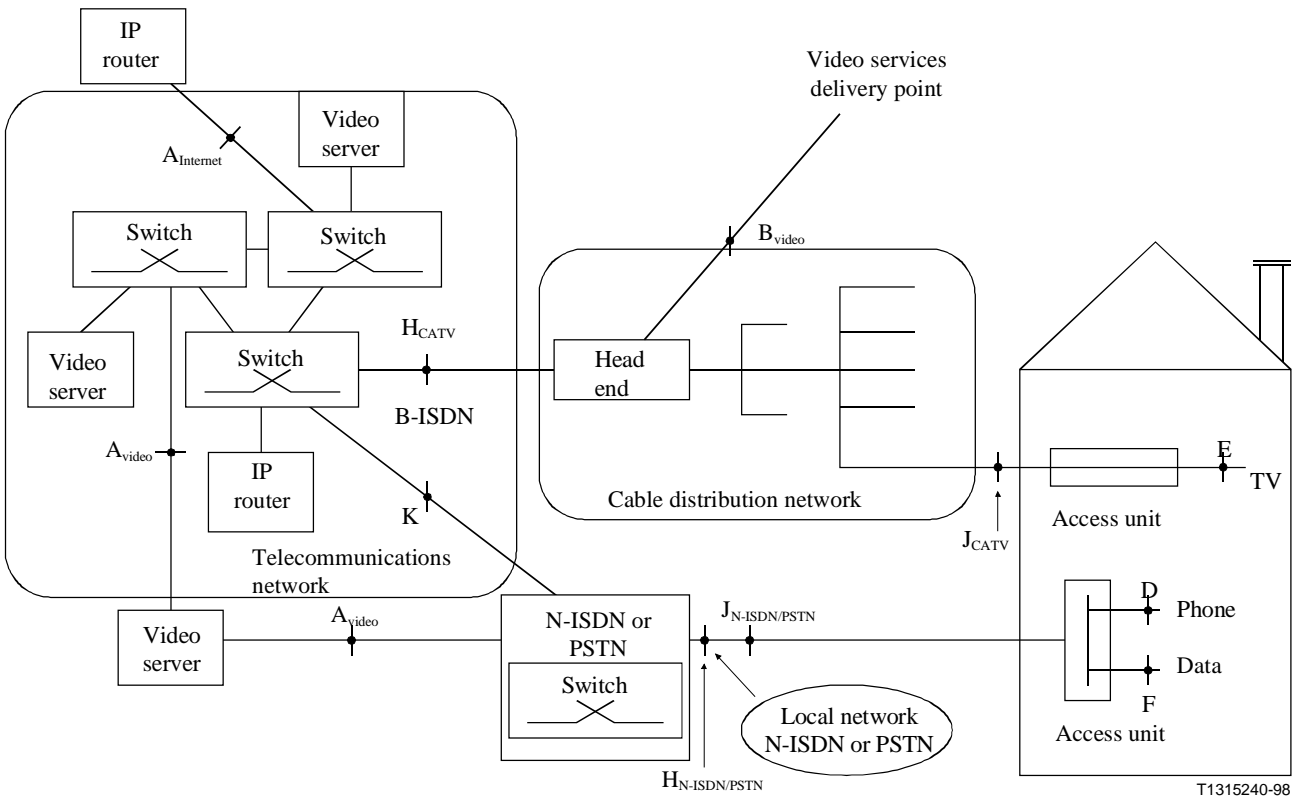
**Logical representation**



**Components**

- Service function: Video server, Video service delivery point, IP router
- Core network: N-ISDN or PSTN, B-ISDN
- Local network: Cable distribution network
- Local network for PSTN or N-ISDN is needed
- CPN: TV, PC, Tel terminal, access unit for N-ISDN or PSTN, CATV

**Physical representation**

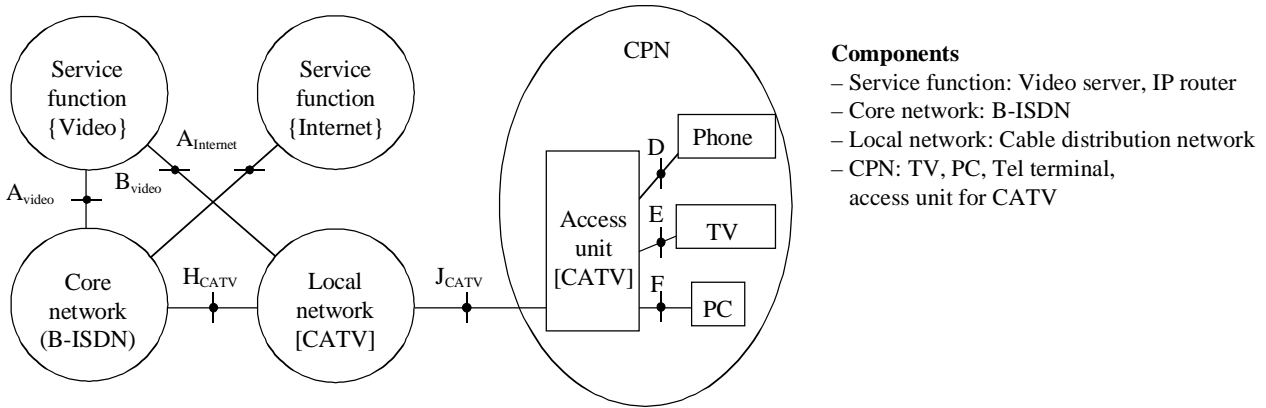


**Figure A.2 a)/Y.120 – Provision of voice/data/video services over one-way cable networks using B-ISDN with independent control channel**

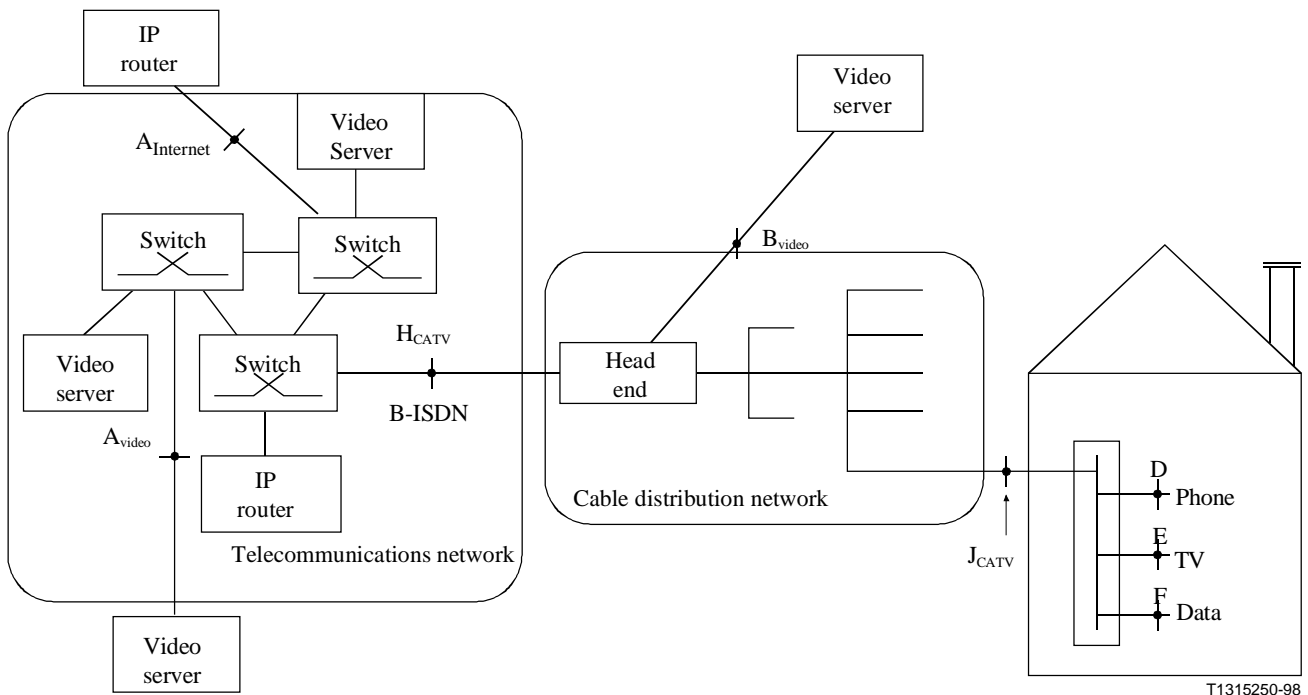
Figure A.2 b) shows a similar configuration to Figure A.1 b), except that B-ISDN is considered.

In this scenario, video service can be delivered to the customer premise either via the  $B_{\text{video}}$  or  $H_{\text{CATV}}$  interfaces. In addition to the kind of questions and issues raised against Figure A.1 b), there is now the question of whether the two video services are compatible and whether a single interface E will accommodate both. Similar considerations arise if videophone service is envisaged.

**Logical representation**



**Physical representation**



**Figure A.2 b)/Y.120 – Provision of voice/data/video services over two-way cable networks using B-ISDN**



### **A.9 Scenario 3 – The use of ADSL or VDSL to provide video bandwidth over copper pairs**

Techniques have been developed for transmitting relatively high bandwidths (1.5-50 MHz) over the existing copper local network, but this works only for relatively short distances. Standardized Asymmetric Digital Subscriber Line (ADSL) systems have downstream (to the subscriber) bit rates up to 8.192 Mbit/s and upstream rates of up to 640 kbit/s. For 2 Mbit/s downstream rate, the range may be as far as 5 km depending on cable gauge, with a reduction of range with an increase of bit rate. Very high speed Digital Subscriber Line (VDSL) is being developed for the range 25 to 50 Mbit/s (downstream), but for much shorter distances (50-500 m). In this case fibre is used as transport to a convenient cross-connect in the local network, before conversion to copper for the remainder of the connection.

#### **Flow information for Figure A.3**

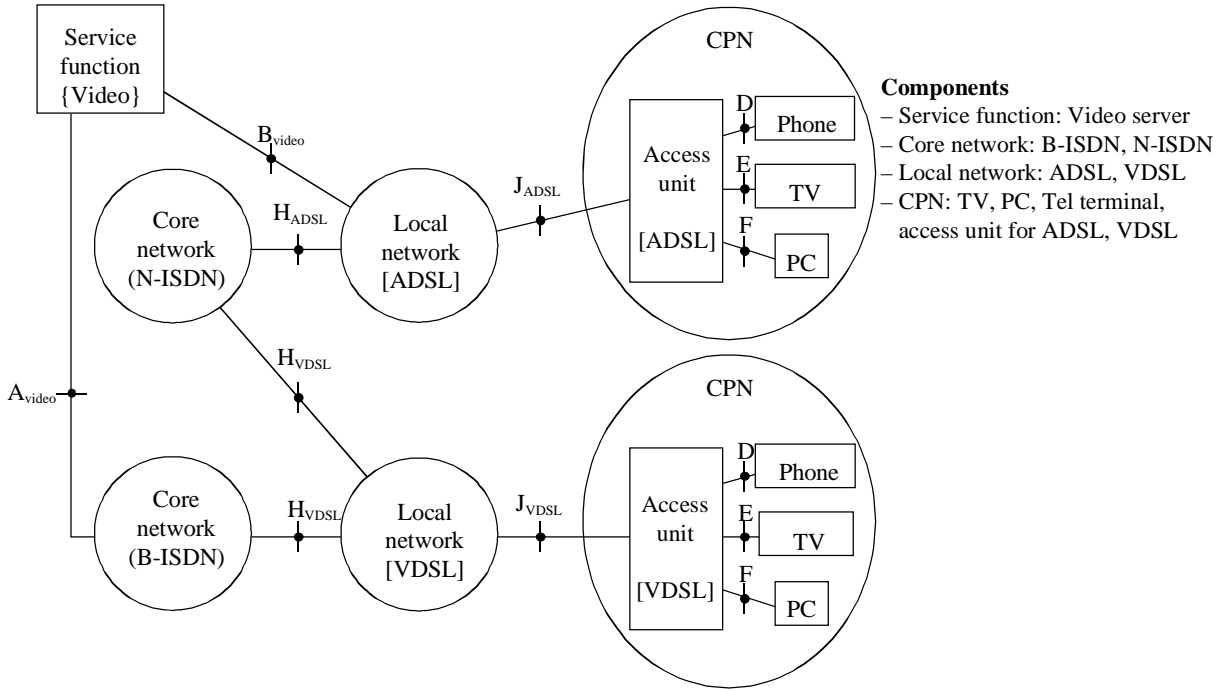
Video services can be delivered to the customer's premise:

- a) from  $B_{\text{video}}$  via  $J_{\text{ADSL}}$ ;
- b) from the video servers via  $B_{\text{video}}$ ,  $H_{\text{ADSL}}$  and  $H_{\text{VDSL}}$  to the cabinet and then via  $J_{\text{VDSL}}$ ; or
- c) from the video server via  $A_{\text{video}}$  and  $H_{\text{VDSL}}$  to the cabinet and then via  $J_{\text{VDSL}}$ .

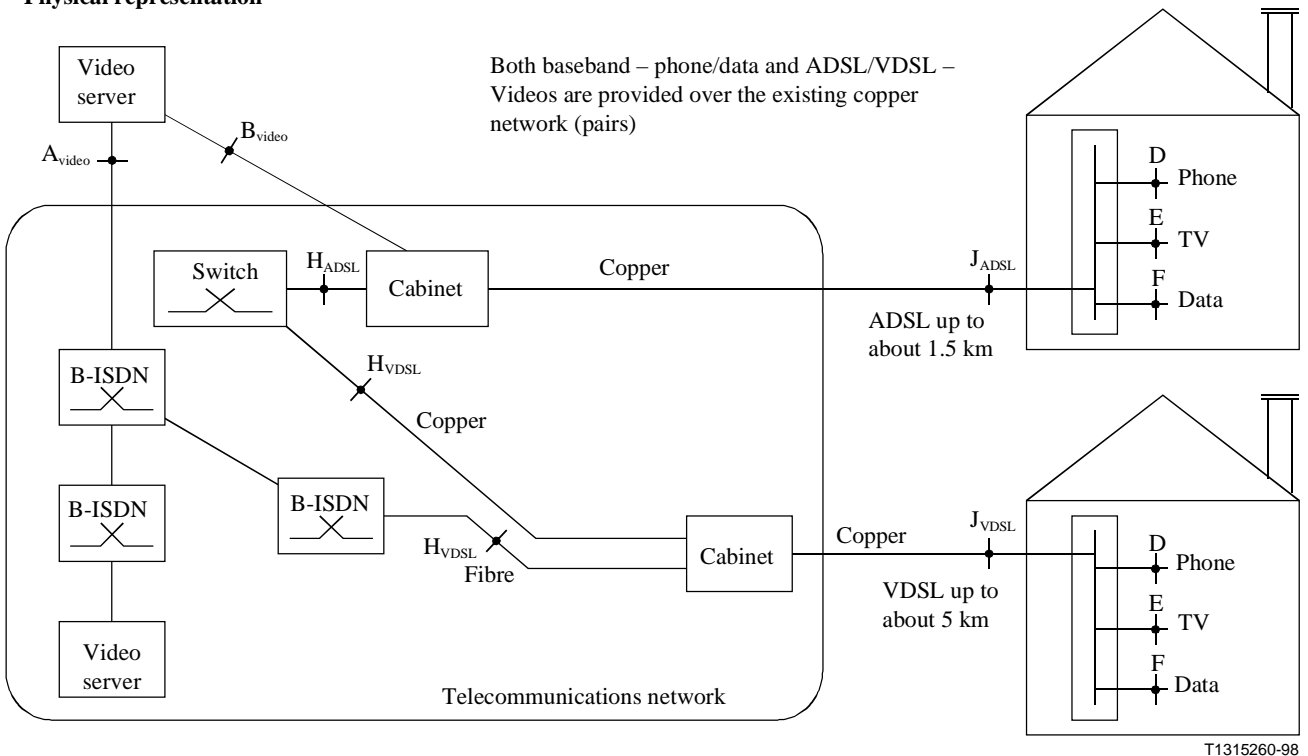
Control information for video services may be exchanged:

- a) via  $J_{\text{ADSL}}$  to the video server via  $B_{\text{video}}$ ;
- b) via  $J_{\text{VDSL}}$ ,  $H_{\text{VDSL}}$ ,  $H_{\text{ADSL}}$  and  $B_{\text{video}}$  to the video server; or
- c) via  $J_{\text{VDSL}}$ ,  $H_{\text{VDSL}}$  and  $A_{\text{video}}$  to the video server.

**Logical representation**



**Physical representation**



**Figure A.3/Y.120 – Provision of video over copper pairs**

## A.10 Scenario 4 – Fibre access scenario

### Flow information for Figure A.4

Video services can be delivered to the customer's premise:

- from  $A_{\text{video}}$  via  $H_{\text{FTTH}}$  and  $J_{\text{FTTH}}$ ; or
- from  $A_{\text{video}}$  via  $H_{\text{FTTC}}$  and  $J_{\text{FTTC}}$ .

Control information for video services may be exchanged:

- via  $J_{\text{FTTH}}$ ,  $H_{\text{FTTH}}$  and  $A_{\text{video}}$  to the video server;
- via  $J_{\text{FTTC}}$ ,  $H_{\text{FTTC}}$  and  $A_{\text{video}}$  to the video server.

#### Logical representation

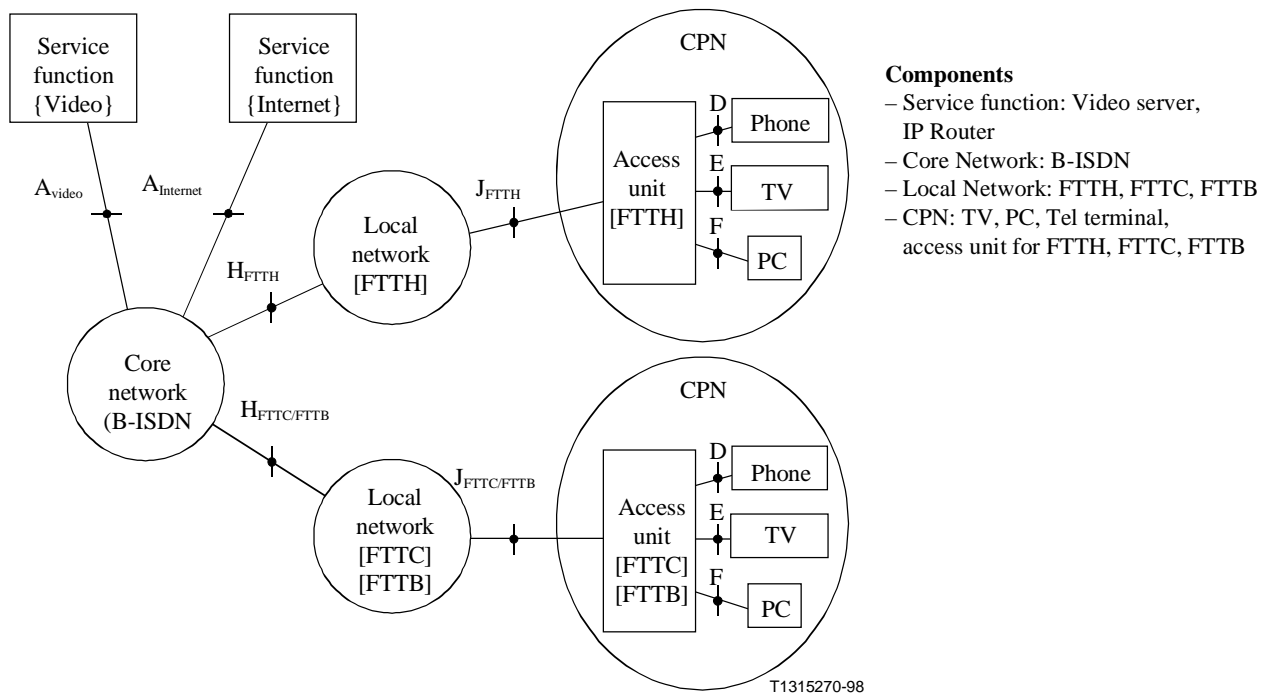
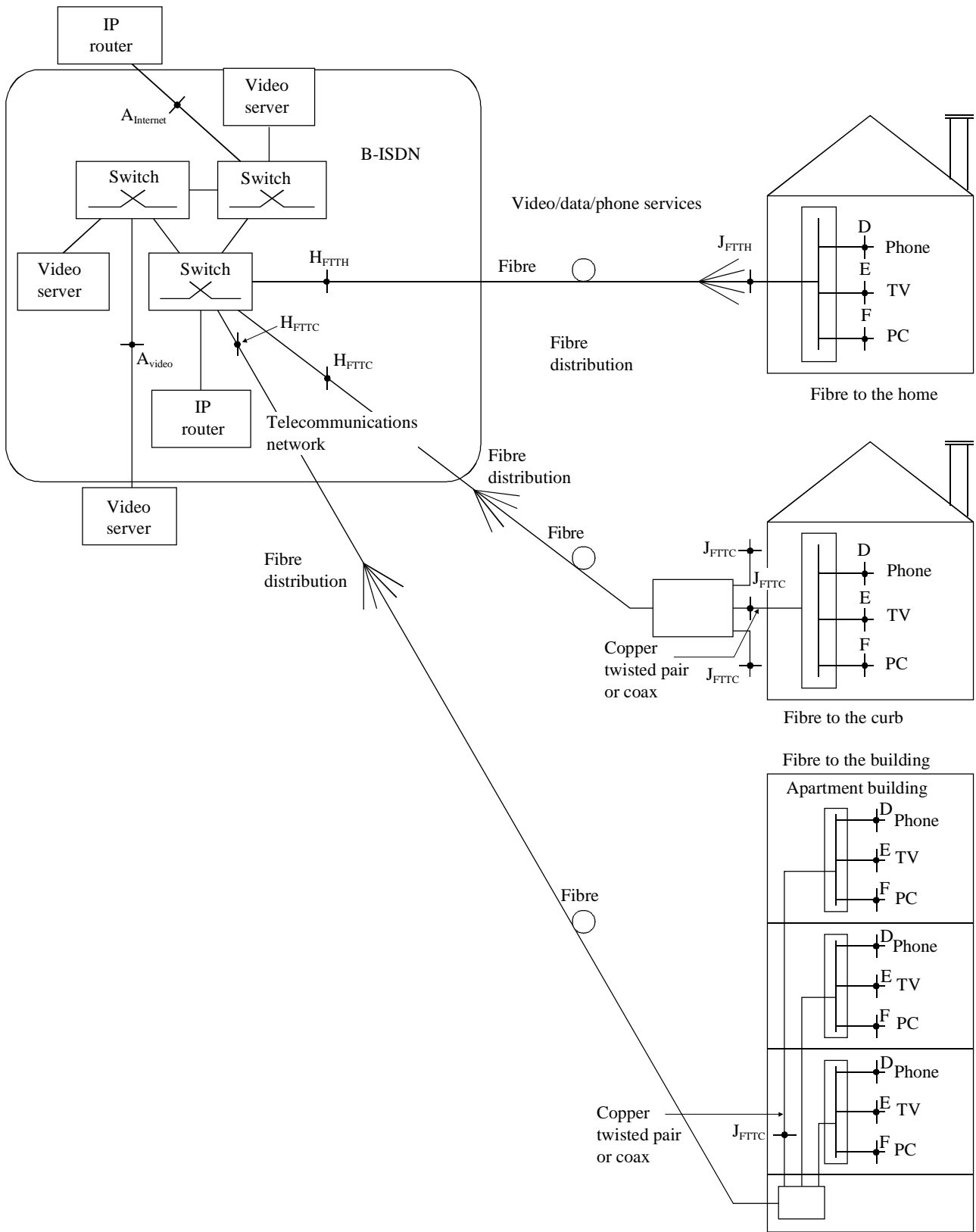


Figure A.4/Y.120 – Fibre access scenario

**Physical representation**

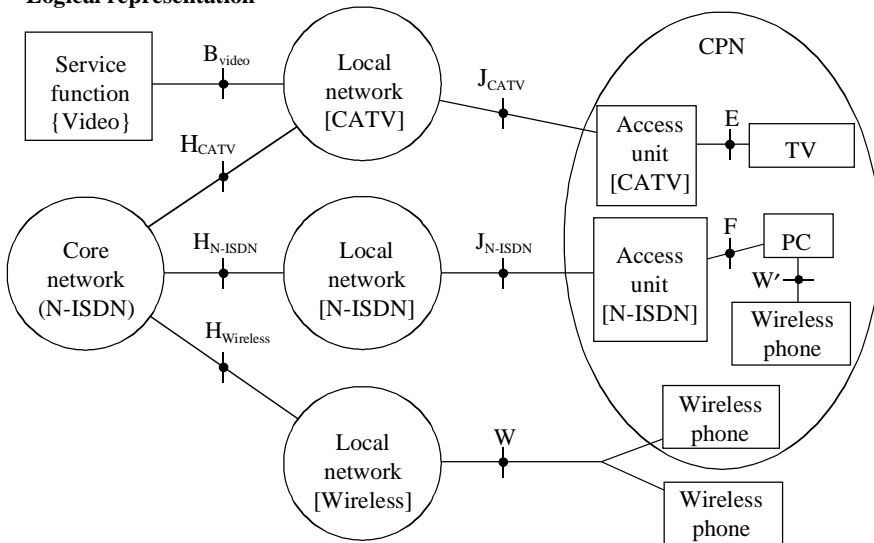


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**Figure A.4/Y.120 – Fibre access scenario (concluded)**

## A.11 Scenario 5 – The use of radio in the local loop

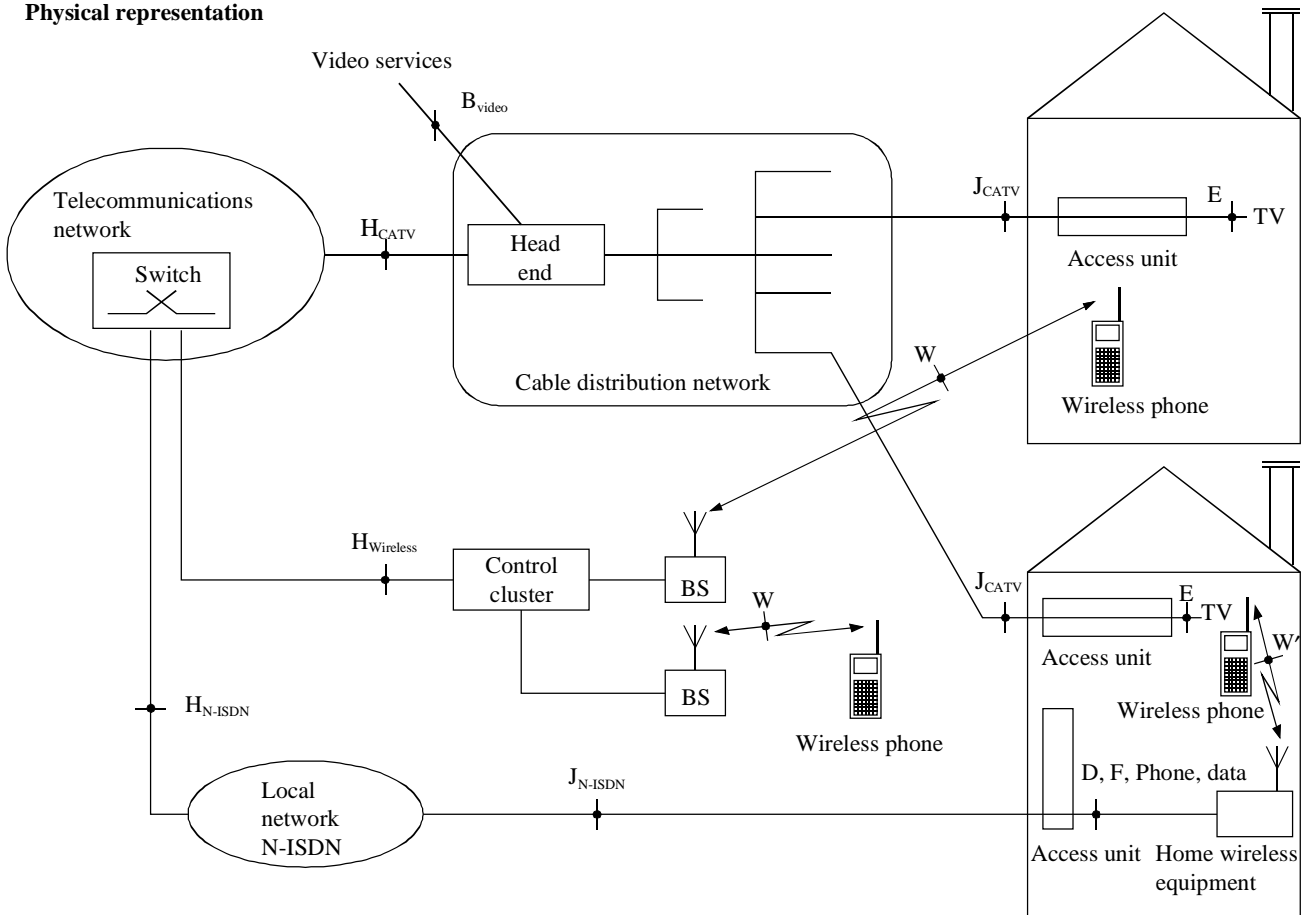
### Logical representation



### Components

- Service function: Video services
- Core network: N-ISDN
- Local network: Cable distribution Network, Wireless Network
- Local network for N- ISDN is needed
- CPN: TV, PC, Tel, wireless terminal, access unit for CATV, N-ISDN

### Physical representation



T1315290-98

a) A control cluster functions to implement connection, authentication and so on.

**Figure A.5 a)/Y.120 – Short-term provision of radio services**

Voice/data are provided to the end user through the access facilities of the local network operator. Those facilities can be either wireless through a public residential base station or wireline (in the latter case it is still possible that the user has a terminal phone if a home wireless equipment e.g. a domestic cordless equipment is attached to the wireline access). Video services are provided through the residential cable network (see "J<sub>CATV</sub>" reference point).

For example in Figure A.1 a) the end user can interact with the head end (i.e. to select a particular movie, e.g. for VOD-like services) sending appropriate control data via the "J<sub>N-ISDN</sub>" reference point; the public switch interprets these commands, eventually prompts the user and instructs the head end via the "H<sub>CATV</sub>" reference point. The advantage of this approach is the reuse of existing infrastructure (i.e. both wireline and wireless transport and control level capabilities).

Figure A.5 b) shows the configuration of the local to core network by using the radio in the local loop. As shown in this figure, voice/data and video services may be provided via the radio local loop, which adopts the coming mobile telecommunication system<sup>1</sup> and the fixed Wireless Local Loop (WLL), efficiently and feasibly in both rural and urban areas.

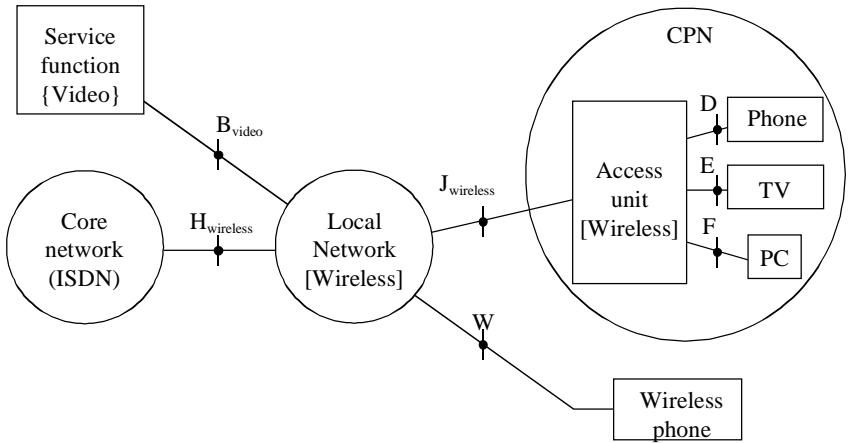
Video services can be delivered to the customer's premise:

- from B<sub>video</sub> to the control cluster and then via J<sub>wireless</sub>.

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<sup>1</sup> International Mobile Telecommunications-2000 (IMT-2000).

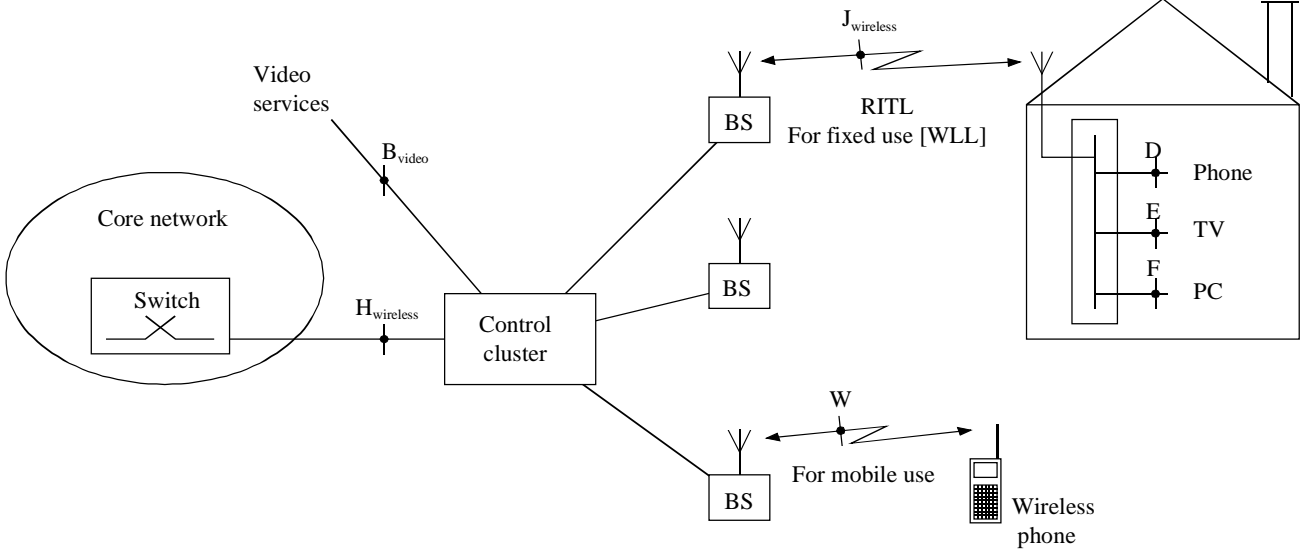
**Logical representation**



**Components**

- Service function: Voice, data and video services
- Core network: N-ISDN or B-ISDN
- Local network: Wireless network
- CPN: TV, PC, Tel, wireless terminal, access unit for WLL

**Physical representation**



T1315300-98

a) A control cluster functions to implement connection, authentication and so on.

**Figure A.5 b)/Y.120 – The use of radio in the local loop**

**A.12 Scenario 6 – Access using satellites**

Scenario 6 describes B-ISDN, Internet and mobile communications services which are supported by satellite networks and the pathways by which they can be delivered to the customer premise. In Figure A.6, satellite radio-frequency links are indicated by dotted lines and terrestrial links (fibre, coaxial cable, wireless, etc.) by solid lines.

Further, video and broadcast services via satellite are described in scenario 1.

**B-ISDN**

Satellite networks capable of supporting B-ISDN can deliver full asynchronous transfer mode services either directly to a customer premise earth station ("access unit") or via a gateway earth station which is not customer equipment. The same satellite system can carry B-ISDN traffic to and from a terrestrial carrier network through such a gateway. These paths are represented by the set of

reference points L,  $J_{SAT}$ ,  $H_{Gateway}$  and  $J_{Gateway}$ . Depending on the characteristics of the satellite network, key interfaces may be present at points  $H_{Gateway}$ ,  $J_{Gateway}$  and (possibly) G. These interfaces maintain end-to-end ATM quality of service parameters between the satellite and terrestrial carrier networks or between the satellite network and the Customer Premises Network (CPN).

### **Internet**

In the case of the Internet backbone satellite network, the Internet service provider uses the satellite network to deliver Internet traffic either directly to the customer premise or to a shared gateway. This service is represented by reference points L,  $J_{Gateway}$  and  $J_{SAT}$ . Since certain TCP/IP flow and congestion control protocols can perform relatively poorly over high-delay links, key interfaces may be present at reference points L,  $J_{SAT}$  and (possibly) F to provide optimal TCP/IP interworking between the satellite and terrestrial network pathways.

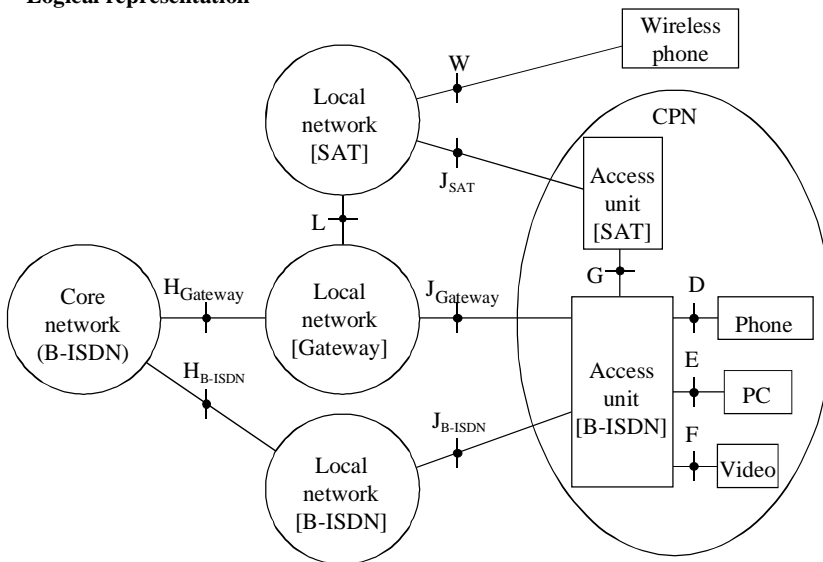
### **Mobile-satellite services**

Mobile-satellite systems provide voice, fax and low-rate data services to the customer. Several service pathways are indicated by reference points R, S, L,  $H_{Gateway}$ ,  $J_{Gateway}$ ,  $J_{B-ISDN}$ , and  $J_{SAT}$ . In this case, traffic to and from the mobile user appliances flows into the mobile-satellite service network (R, S). From there it can be delivered to the customer premises via several possible paths (for example, through  $J_{SAT}$ , or L- $H_{Gateway}$ - $J_{B-ISDN}$ ). The speech compression techniques typically used in mobile services may indicate a need for key interfaces between the mobile appliance and the fixed appliance in order to maintain voice quality of service. Candidate reference points for this type of interface are G, D,  $J_{Gateway}$ ,  $H_{Gateway}$  and/or  $J_{SAT}$ .

It should be noted that several combinations of these services can be supported by this scenario (e.g. mobile Internet); however, for purposes of brevity they are not discussed here.



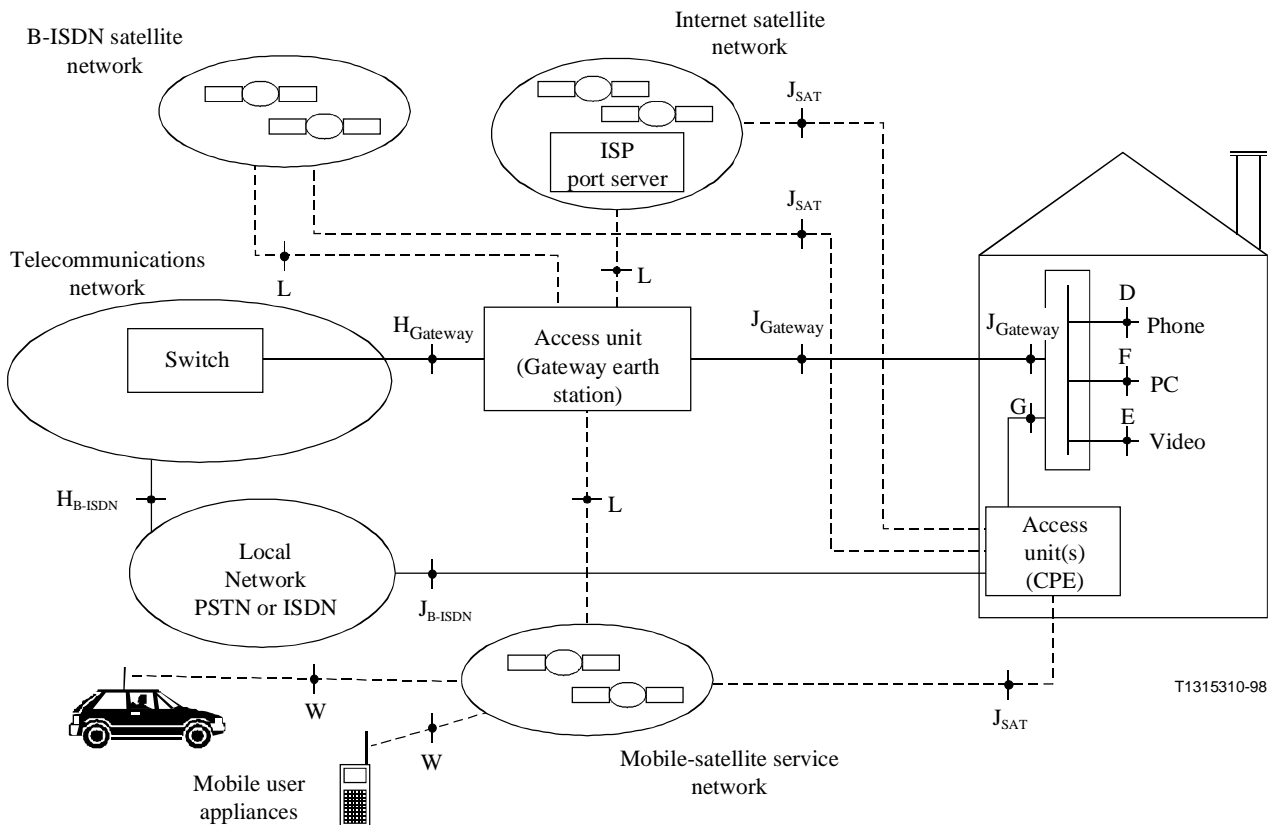
**Logical representation**



**Components**

- Core network: B-ISDN or existing N-ISDN
- Local network: SAT, Gateway (B-ISDN, Internet, mobile)
- Local network for B-ISDN is needed
- CPN: TV, PC, Tel terminal, access unit for SAT, (B-ISDN)

**Physical representation**



**Figure A.6/Y.120 – Access using satellites**

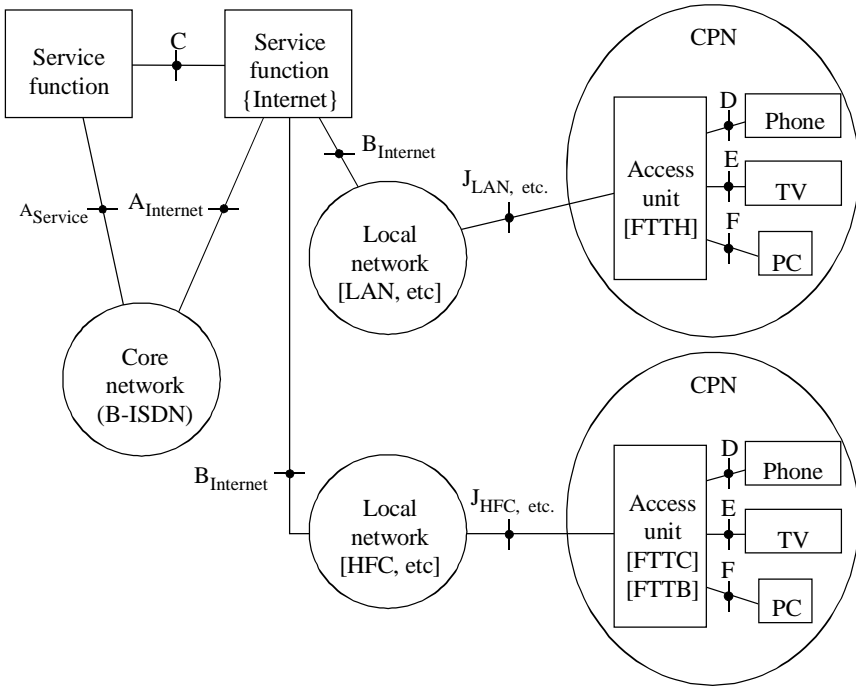
**A.13 Scenario 7 – Example of Internet access**

The Internet requires individual, two-way and preferably high-speed connections. This scenario shows fast access to the Internet (Case 1) and interworking between the Internet and a high-speed ATM network as backbone (Case 2).



functions such as address resolution, configuration and coordination, processing of broadcasts, multicasts and lost packets.

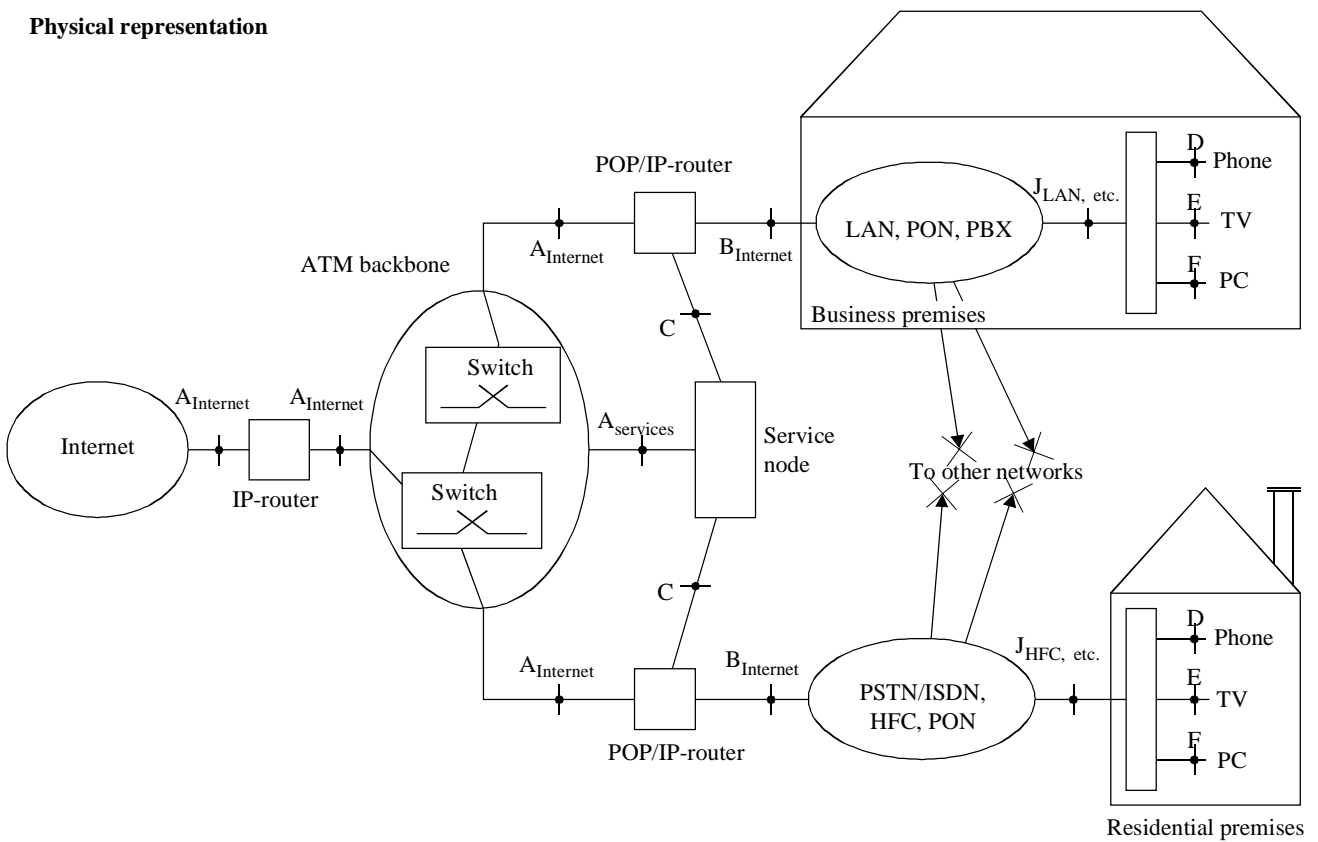
**Logical representation**



**Components**

- Service function: Service node, POP/IP-router
- Core network: ATM backbone, Internet
- Local network: LAN, PON, PBX, PSTN/ISDN, HFC
- CPN: TV, PC, Tel. terminal, access unit for many networks

**Physical representation**



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**Figure A.7 b)/Y.120 – Internetworking between the Internet and ATM network (Case 2)**

#### **A.14 Summary of scenarios**

Table A.1 summarizes the scenarios in terms of:

- 1) the services;
- 2) the core network;
- 3) the local network;
- 4) the customer premises network; and
- 5) the information flow.

The underlined characteristics inside the bold boundaries indicate the differentiating attributes from other scenarios.

**Table A.1/Y.120 – Summary of scenarios**

	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>	<b>Scenario 5</b>	<b>Scenario 6</b>	<b>Scenario 7</b>
<b>Services</b>	a) <u>Voice/Data</u> over telecom network and <u>Video</u> over cable, Radio & DSB b) <u>Voice/Data/Video</u> over 2-way cable	a) <u>Voice/Data</u> over telecom network and <u>Video</u> over cable b) <u>Voice/Data/Video</u> over 2-way cable	Voice/Data & Video over ADSL/VDSL	Voice/Data & Video over Fibre Network	a) <u>Wireless Phone/Voice/Data</u> over telecom network; Video over cable b) <u>Voice/Data/Video</u> over Radio	B-ISDN, Internet and Mobile Phone via Satellite	a) Data over <u>Internet</u> b) <u>Voice/Video</u> and/or <u>Data</u> over <u>Internet</u>
<b>Core Network</b>	<u>Existing Infrastructure</u> (PSTN/N-ISDN)	B-ISDN	B-ISDN	B-ISDN	N-ISDN or B-ISDN	B-ISDN or Existing (N-ISDN)	1) POTS/FR/ATM 2) ATM Backbone
<b>Local network</b>	a) 1-way <u>Cable Distribution Network</u> b) 2-way <u>Cable Distribution Network</u> DSB/terrestrial broadcasting in 1a)		<u>ADSL/HDSL</u>	<u>Fibre</u> (Fibre to the curb/home)	<u>Radio/Wireless</u> for Voice/Data; Cable for Video	Satellite	1) ADSL 2) PSTN/ISDN, HFC, PON
<b>CPN</b>	Access Unit TV, PC, Phone	Access Unit TV, PC, Phone	Access Unit TV, PC, Phone	Access Unit TV, PC, Phone	Access Unit TV, PC, Phone, Wireless Phone	Access Unit TV, PC, Phone	Access Unit TV, PC, Phone
<b>Information flow</b>	a) Video Distribution over 1-way cable network, return via PSTN/ISDN				2-way Wireless	2-way Satellite	



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