AMENDED SHEET

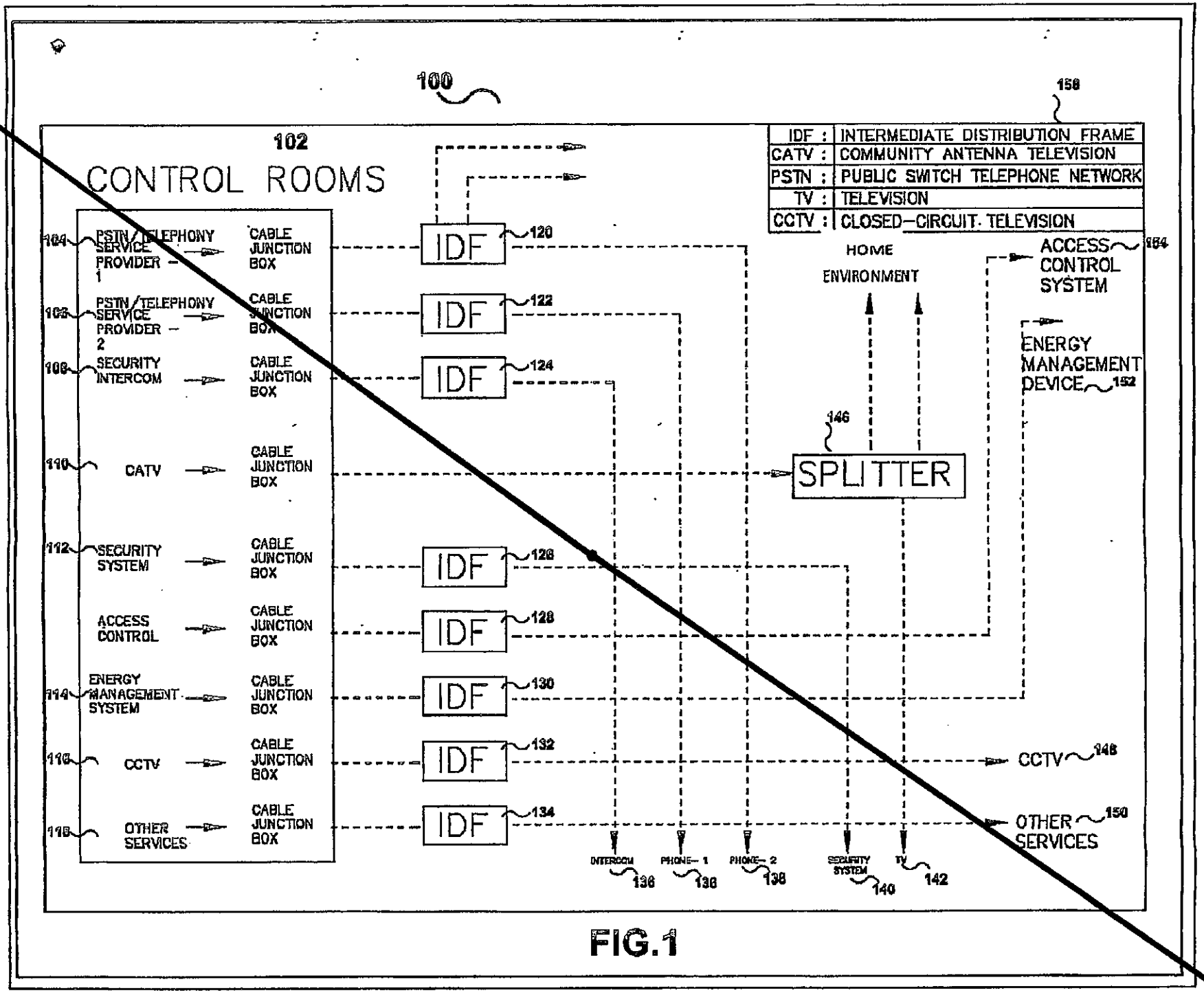


FIG.1

PCT/IN 2009/000 475 - 05-07-2010

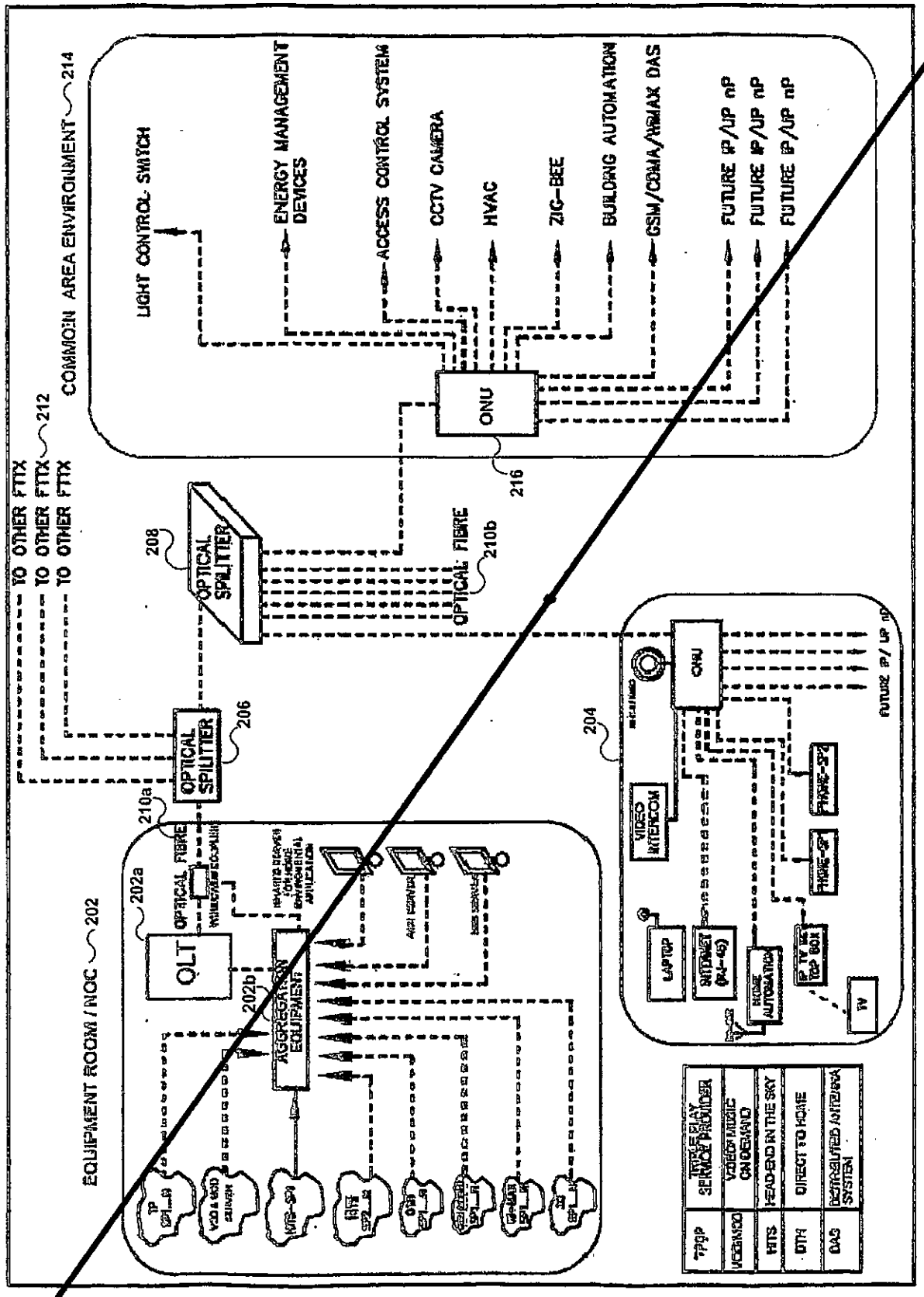

200
EQUIPMENT ROOM / NOC
202
202a
202b
QLT
AGGREGATION EQUIPMENT
OPTICAL FIBRE
210a
OPTICAL SPLITTER
206
208
OPTICAL SPLITTER
OPTICAL FIBRE
210b
TO OTHER FTTX
TO OTHER FTTX
TO OTHER FTTX
212
COMMOIN AREA ENVIRONMENT
214
LIGHT CONTROL SWITCH
ENERGY MANAGEMENT DEVICES
ACCESS CONTROL SYSTEM
CCTV CAMERA
HVAC
ZIG-BEE
BUILDING AUTOMATION
GSM/CDMA/WiMAX BAS
FUTURE IP/UP nP
FUTURE IP/UP nP
FUTURE IP/UP nP
ONU
216
204
ONU
VIDEO INTERCOM
LAPTOP
INTERNET
HOME AUTOMATION
TV
PHONE-SP1
PHONE-SP2
TRIPLE PLAY SERVICE PROVIDER
VIDEO ON DEMAND
HEADEND IN THE SKY
DIRECT TO HOME
DISTRIBUTED ANTENNA SYSTEM
720P
VOD&MOD
HITS
DTH
DAS

FIG.2

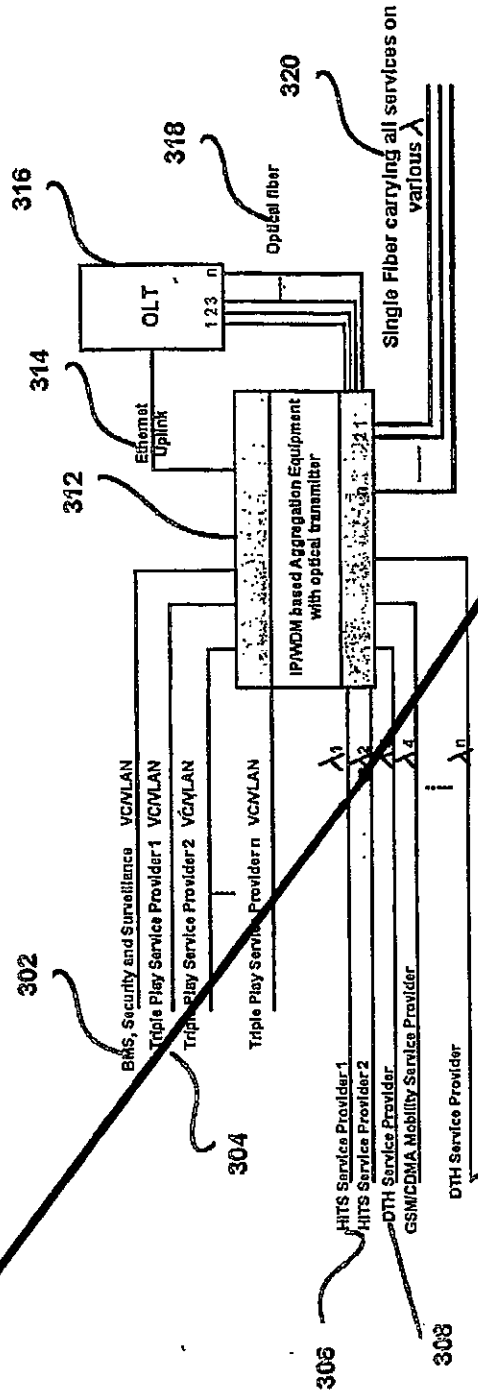

316
318
320
OLT
Optical fiber
Single Fiber carrying all services on various λ
314
Ethernet Uplink
312
IP/WDM based Aggregation Equipment with optical transmitter
BMS, Security and Surveillance VC/VLAN
Triple Play Service Provider1 VC/VLAN
Triple Play Service Provider2 VC/VLAN
Triple Play Service Providern VC/VLAN
302
304
HITS Service Provider1
HITS Service Provider2
DTH Service Provider
GSM/CDMA Mobility Service Provider
DTH Service Provider
306
308
310

FIG. 3

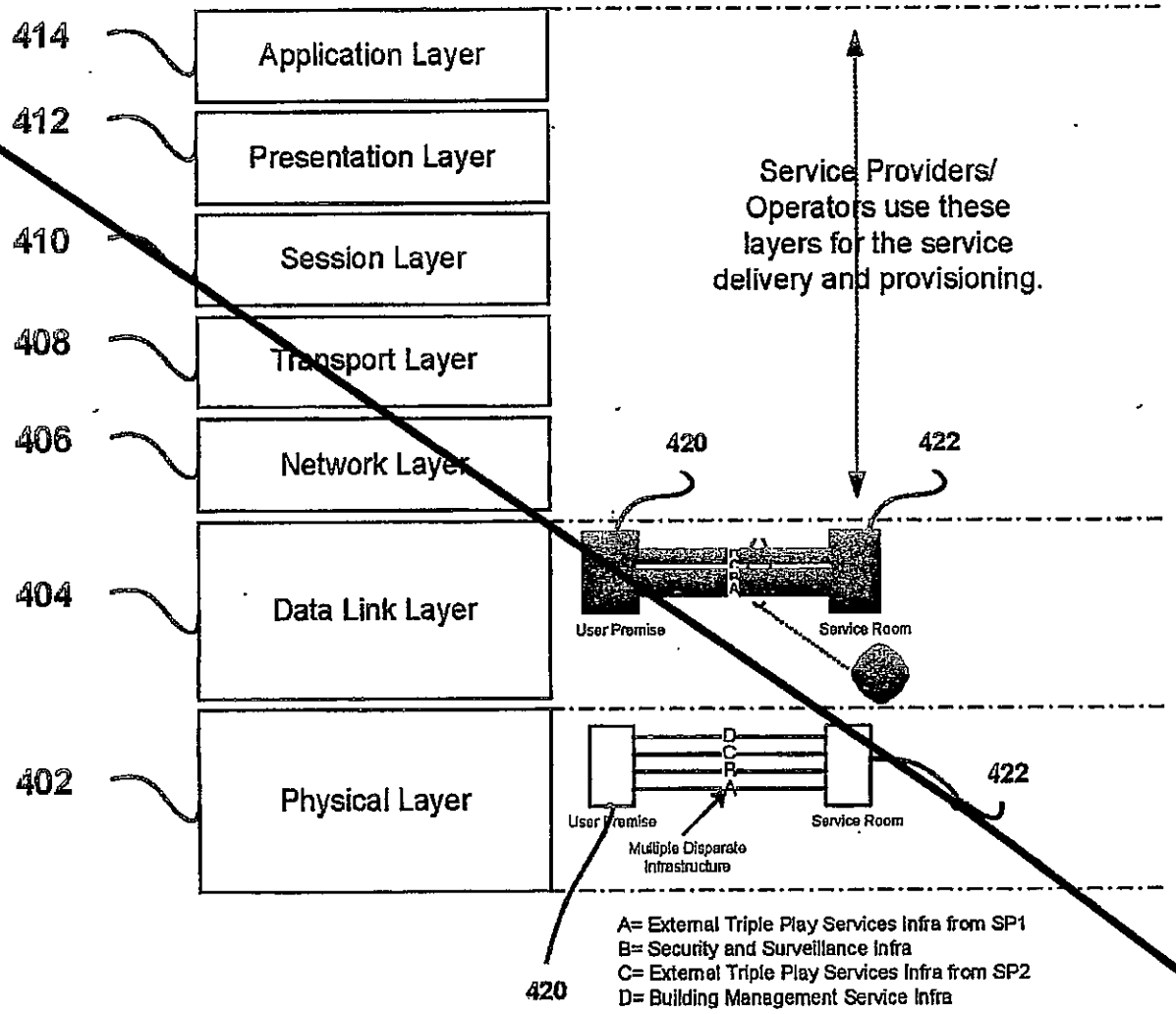

414
Application Layer
412
Presentation Layer
410
Session Layer
408
Transport Layer
406
Network Layer
404
Data Link Layer
402
Physical Layer
Service Providers/ Operators use these layers for the service delivery and provisioning.
420
422
User Premise
Service Room
D
C
B
A
User Premise
Service Room
422
Multiple Disparate Infrastructure
420
A= External Triple Play Services Infra from SP1
B= Security and Surveillance Infra
C= External Triple Play Services Infra from SP2
D= Building Management Service Infra

FIG.4

AMENDED SHEET

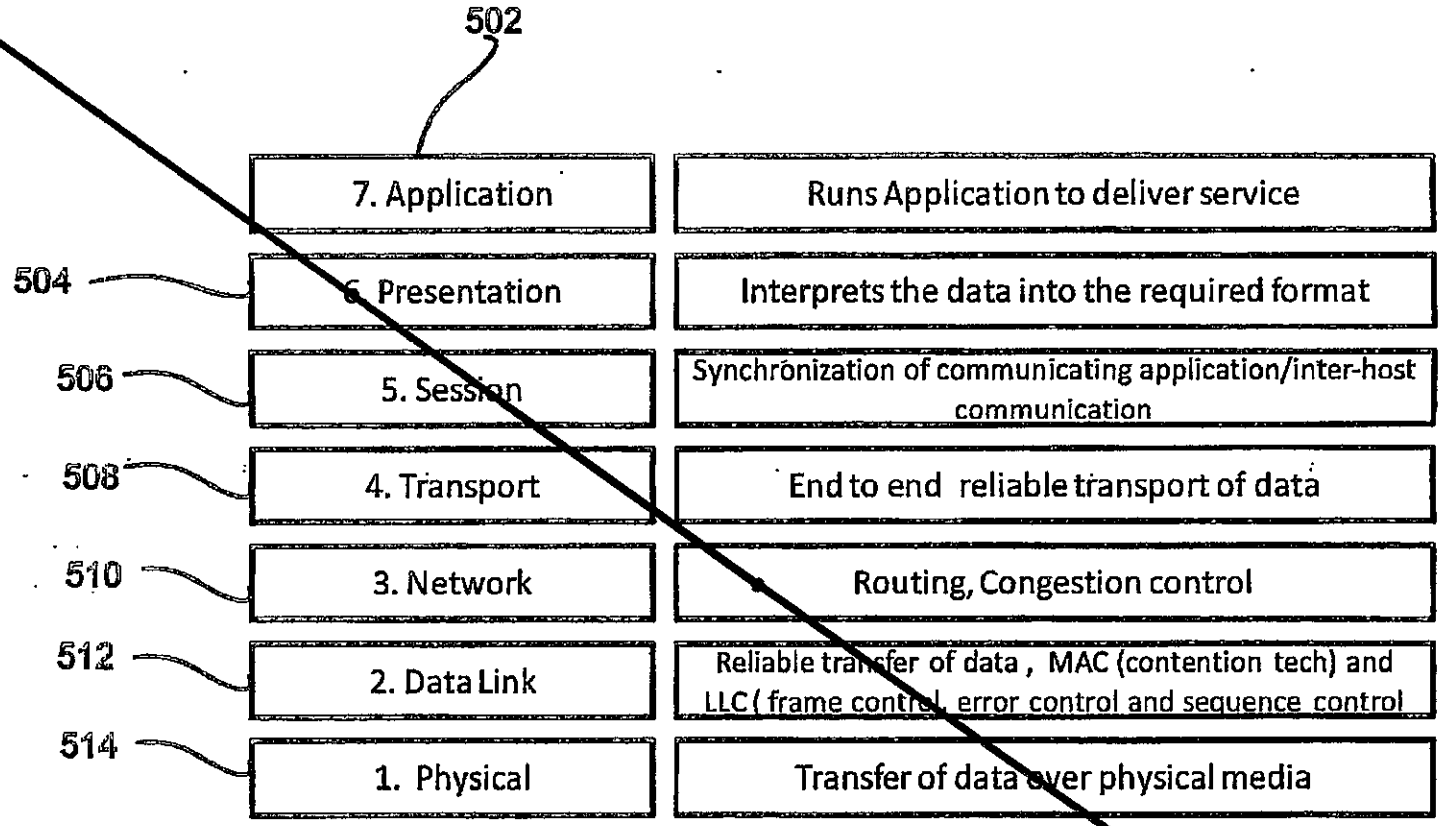


FIG.5

PCT/IN 2009/000 475 - 05-07-2010

AMENDED SHEET

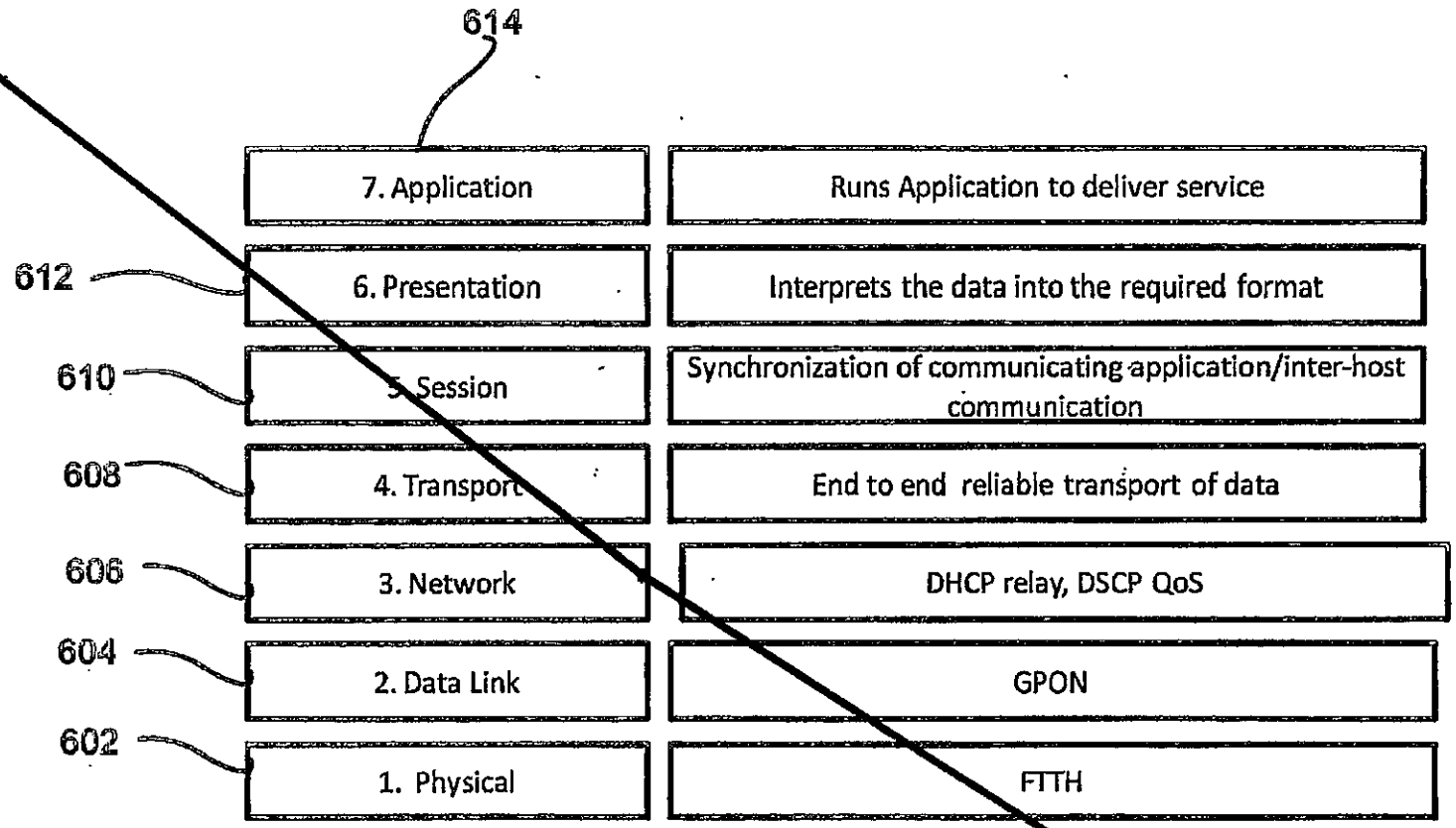


FIG 6

PCT/IN 2009/000 475 - 05-07-2010

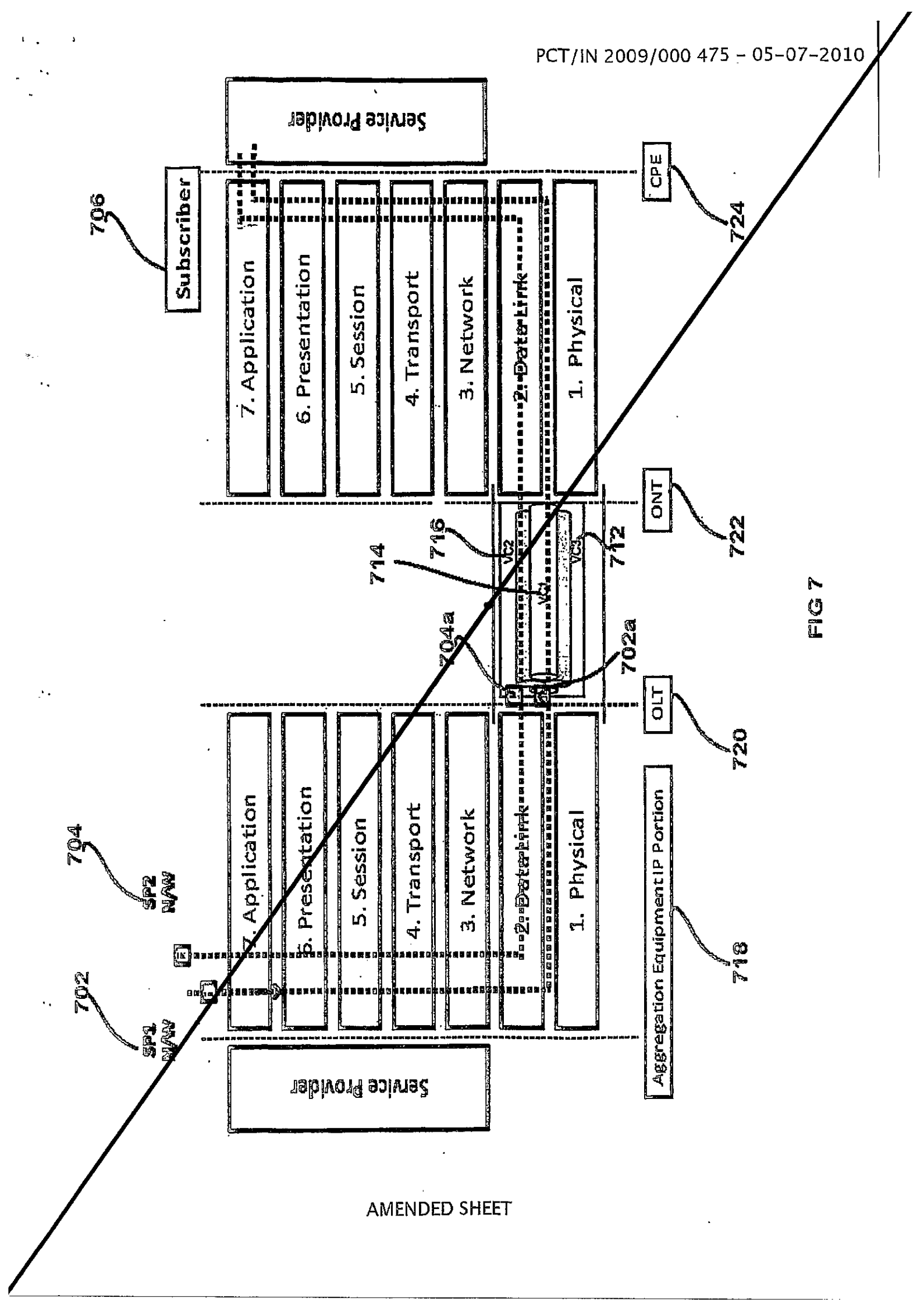

Service Provider
Subscriber
706
7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical
CPE
724
ONT
722
714
716
712
VC2
VC1
VC3
704a
702a
OLT
720
Aggregation Equipment IP Portion
718
704
SP2 NW
702
SP1 NW
Service Provider

FIG 7

Service Provider
Invention
818
810
7. Application
812
6. Presentation
810
5. Session
808
808
804
802
1. Physical
Service Provider provisions different services for the subscribers over the virtual circuit. The service provider would be able to manage/configure and control the services from its NOC/EMS
Virtual Circuit handing over to SP
X-PON network established over FTTX architecture. Subsequently, Virtual Circuit created per service and handed over to the service providers for service provisioning.
SP : Service Provider
NOC : Network Operation Centre
EMS : Element Management Software

FIG.8

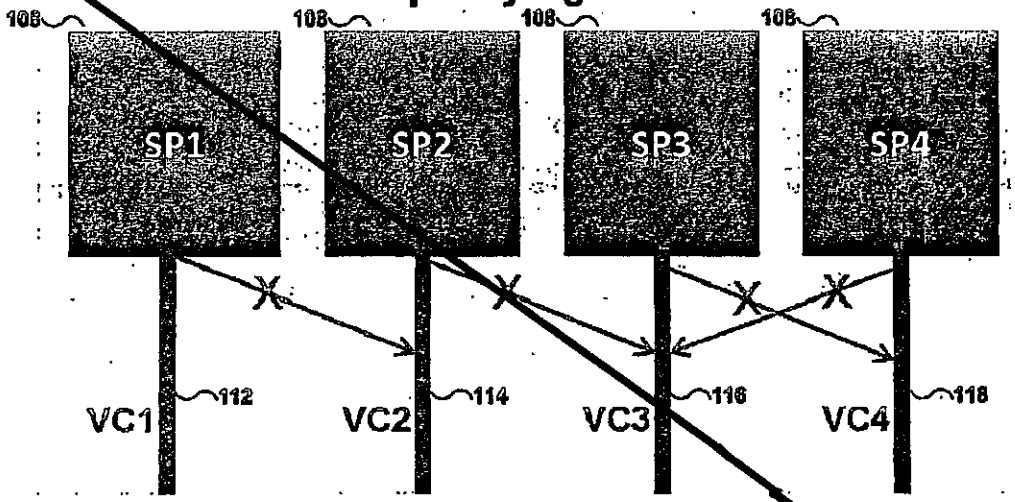
Service Provider
Invention
Multiple Service Providers ride the services
SP1
SP2
SP3
SP4
116
918
920
922
Handing over of VC to SPs
X-PON network established over FTTX architecture.
Subsequently, created Virtual Circuit per service
handed over to the service providers for service
provisioning.
7. Application
6. Presentation
5. Session
3. Network
2. Data Link
1. Physical
904
912
910
908
906
904
902
SP : Service Provider
VC : Virtual Circuit

FIG.9

AMENDED SHEET

Exclusive right of access to VC for every SP

Service Provider cannot access the other SP's VC to manipulate/ configure/control Service Provider specific service delivery-specific QOS /policy/rights.



OLT - XPON Network over FTTX

QOS : Sequence/ Access priority of Services

FIG.10

PCT/IN 2009/000 475 – 05-07-2010

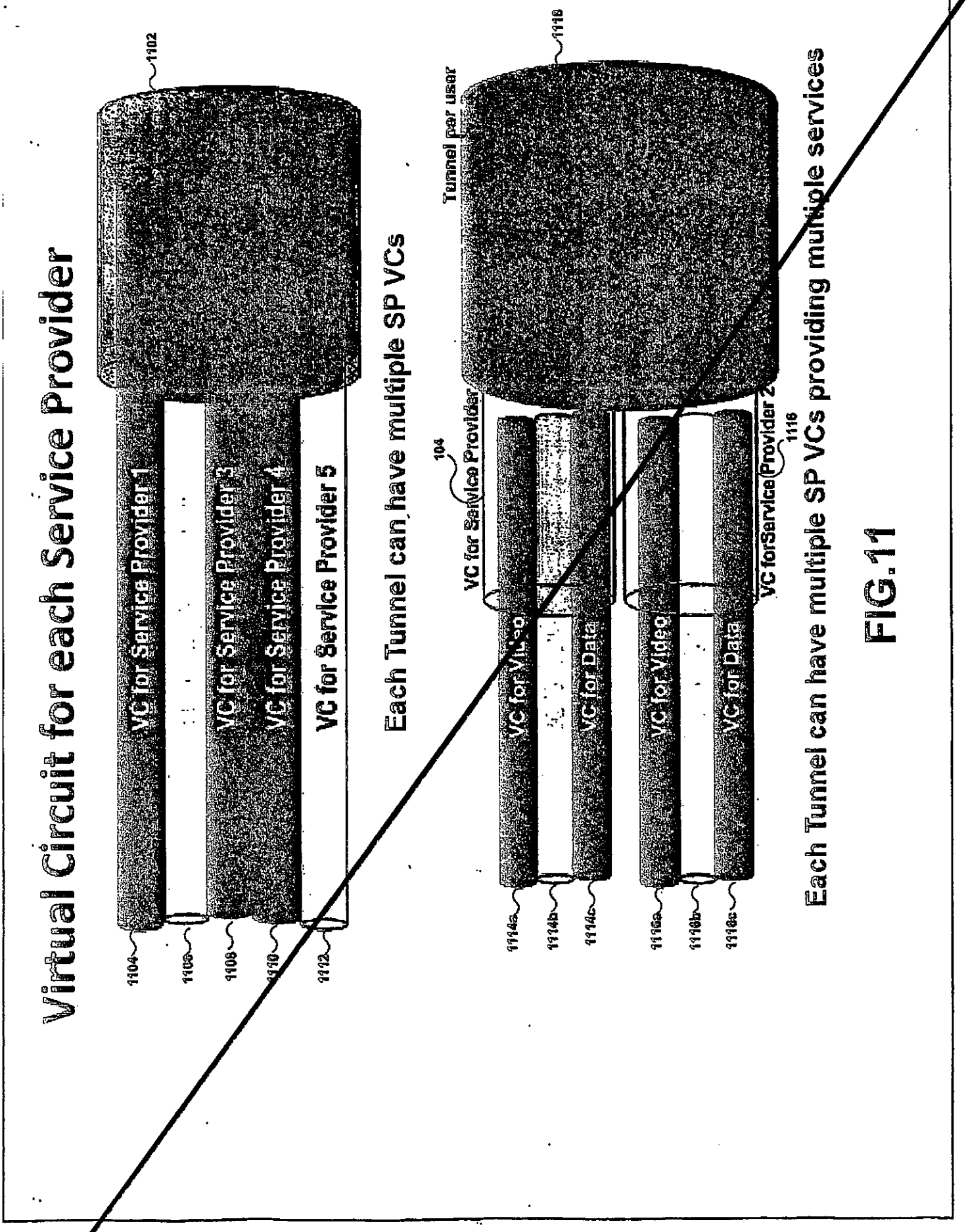

Virtual Circuit for each Service Provider
1102
VC for Service Provider 1
VC for Service Provider 3
VC for Service Provider 4
VC for Service Provider 5
1104
1106
1108
1110
1112
Each Tunnel can have multiple SP VCs
Tunnel per user
1118
VC for Service Provider
104
VC for Video
VC for Data
VC for Video
VC for Data
VC forService Provider 2
1116
1114a
1114b
1114c
1116a
1116b
1116c
Each Tunnel can have multiple SP VCs providing multiple services

FIG.11

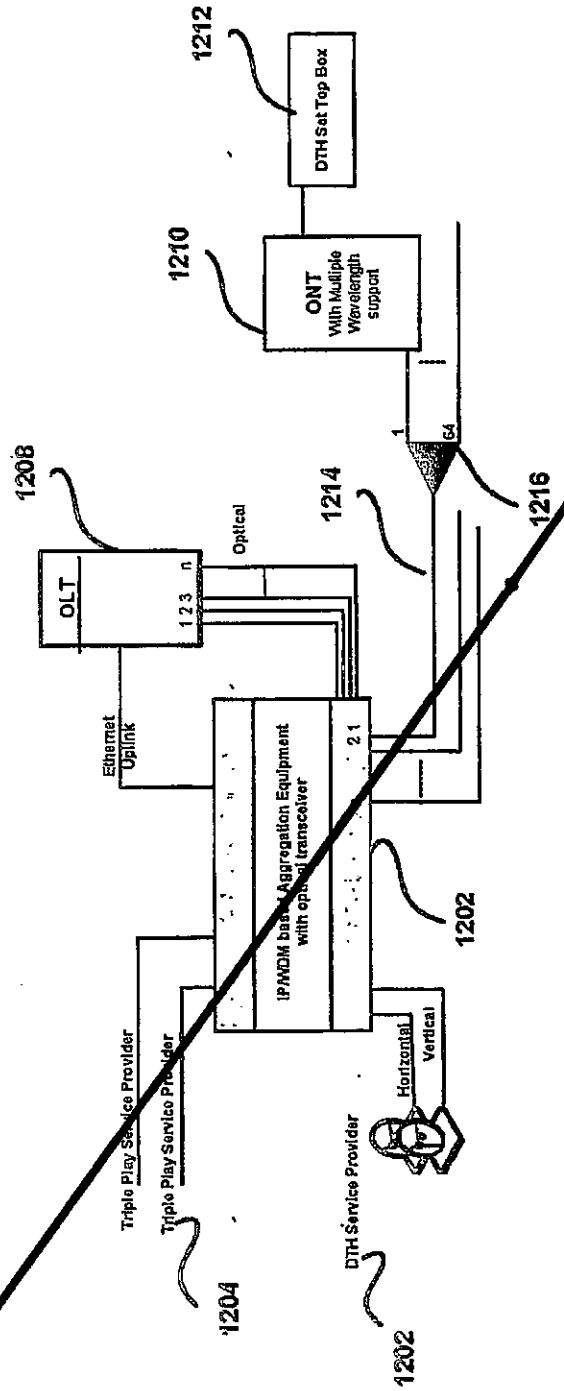

1212
DTH Set Top Box
1210
ONT
With Multiple Wavelength support
1
64
1216
1214
1208
OLT
Optical
1 2 3 n
Ethernet Uplink
IP/MPLS based Aggregation Equipment with optical transceiver
2 1
1202
Horizontal
Vertical
Triple Play Service Provider
Triple Play Service Provider
DTH Service Provider
1204
1202

FIG. 12

Aggregation Equipment
Splitter
ONU
Service Pipeline-SP1 Layer3 device
Service Pipeline-SP2 Layer3 device
RF Service Pipelines-DTH/HITS/IBS
VoIP
Video
HSI
VoIP
Video
HSI
RF
RF
RF Set Top Box SP2
RF Set Top Box SP1

FIG.13

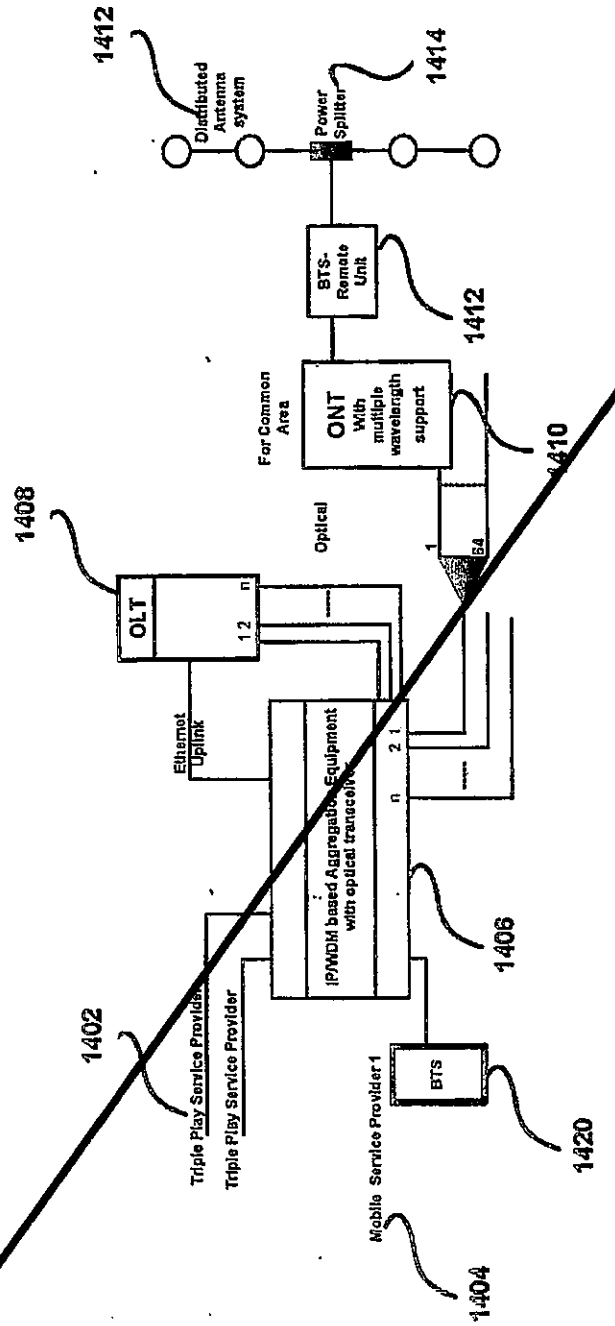

1412
Distributed Antenna system
1414
Power Splitter
BTS-Remote Unit
1412
For Common Area
ONT With multiple wavelength support
1410
1408
Optical
OLT
Ethernet Uplink
IP/WDM based Aggregation Equipment with optical transceiver
1406
1402
Triple Play Service Provider
Triple Play Service Provider
BTS
1420
Mobile Service Provider 1
1404

FIG. 14

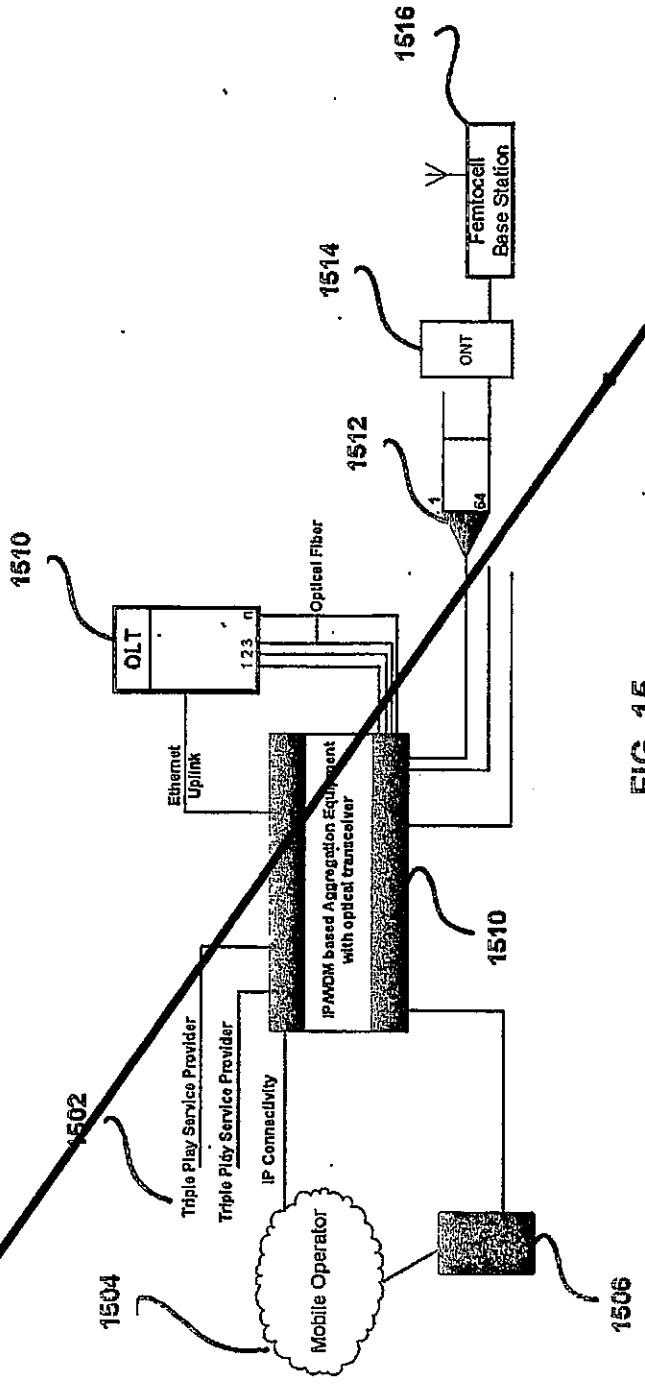

1516
Femtocell Base Station
1514
ONT
1512
1
64
1510
OLT
1 2 3 n
Optical Fiber
Ethernet Uplink
IP/WDM based Aggregation Equipment with optical transceiver
1510
Triple Play Service Provider
Triple Play Service Provider
IP Connectivity
1502
Mobile Operator
1504
1506

FIG. 15

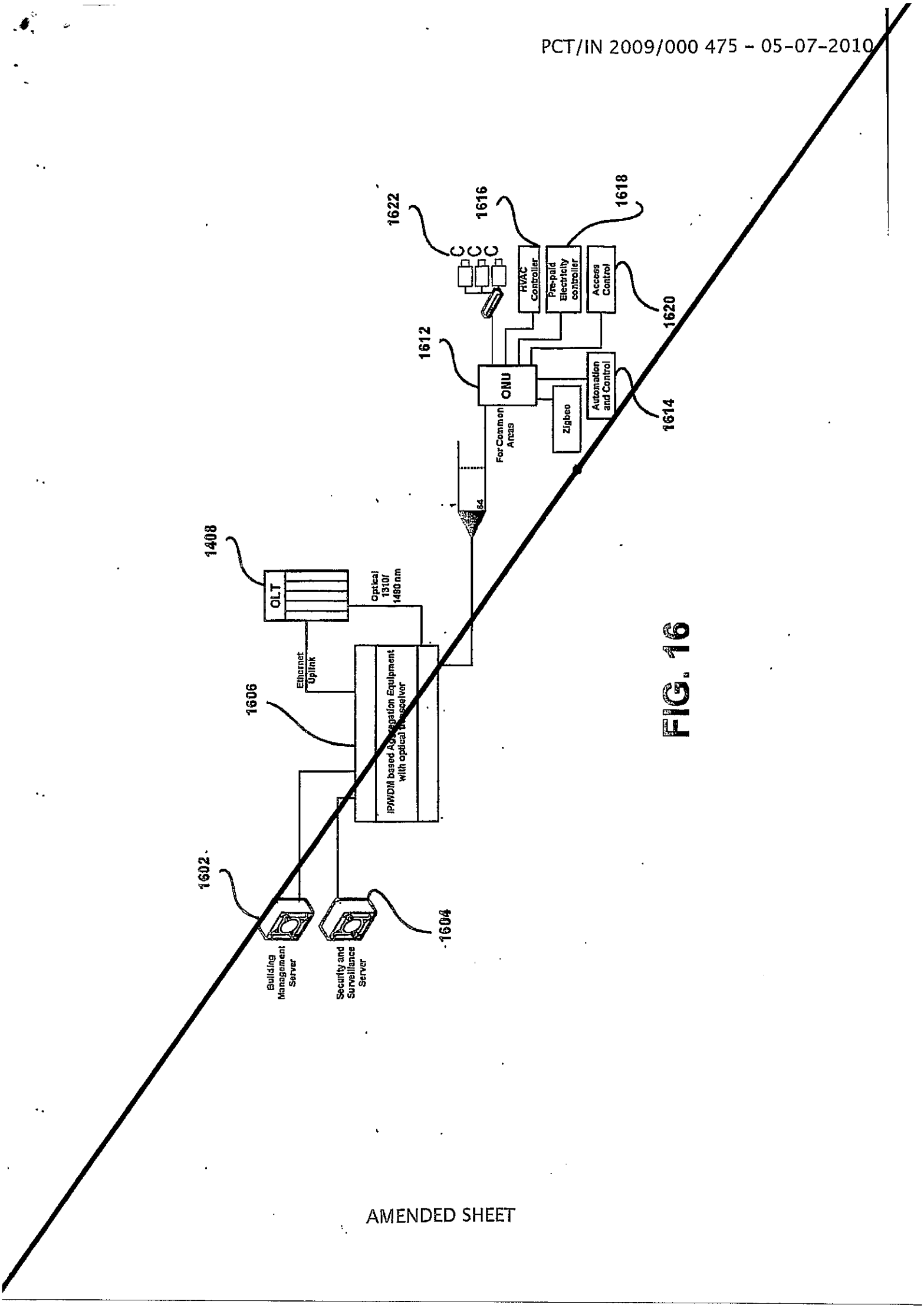

1622
1616
1618
HVAC Controller
Pre-paid Electricity controller
Access Control
1620
1612
ONU
Automation and Control
1614
Zigbee
For Common Areas
1408
OLT
Optical 1310/ 1490 nm
Ethernet Uplink
1606
IP/WDM based Aggregation Equipment with optical transceiver
1602
1604
Building Management Server
Security and Surveillance Server

FIG. 16

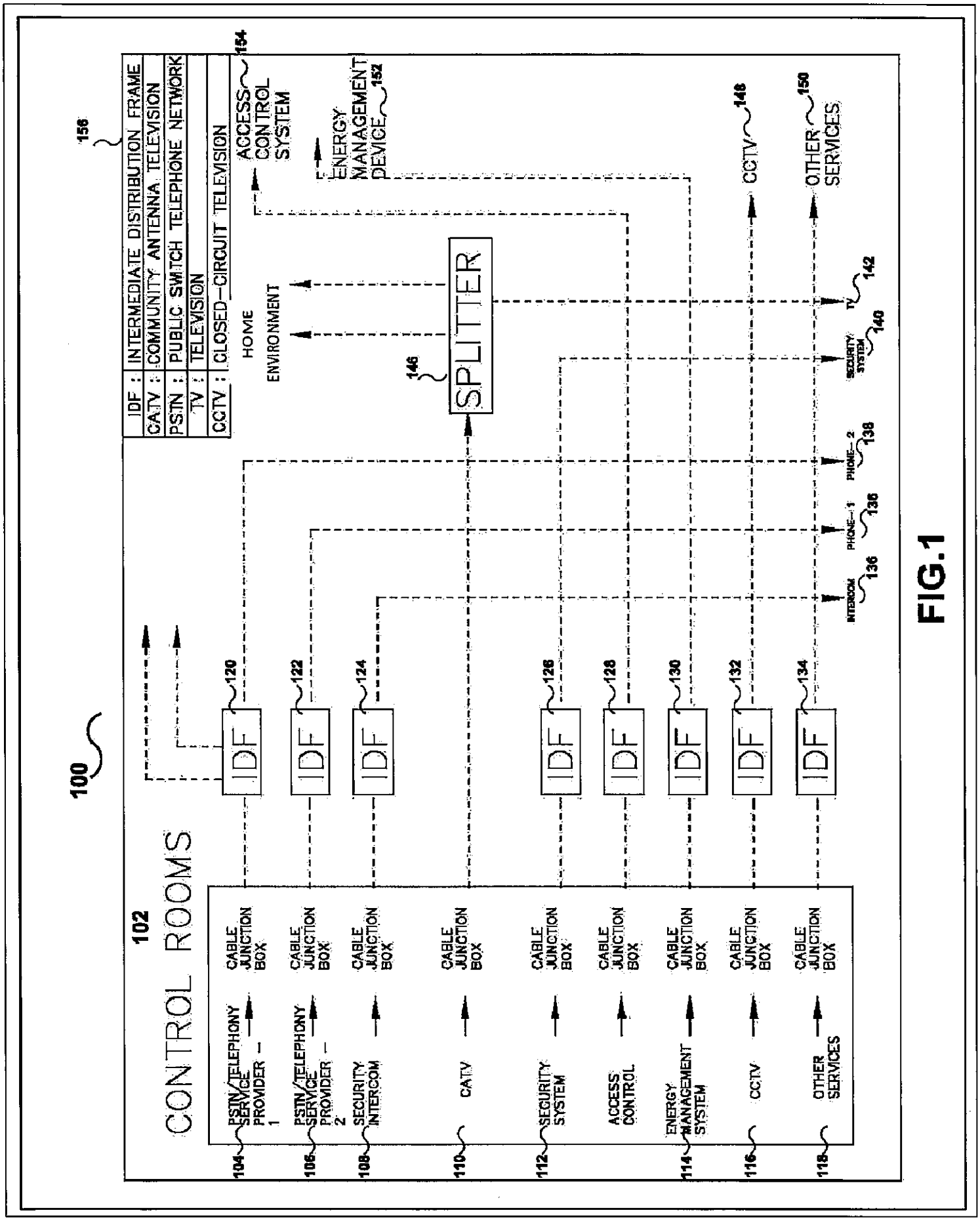

100
102
CONTROL ROOMS
IDF : INTERMEDIATE DISTRIBUTION FRAME
CATV : COMMUNITY ANTENNA TELEVISION
PSTN : PUBLIC SWITCH TELEPHONE NETWORK
TV : TELEVISION
CCTV : CLOSED-CIRCUIT TELEVISION
156
154
ACCESS CONTROL SYSTEM
152
ENERGY MANAGEMENT DEVICE
148
CCTV
150
OTHER SERVICES
HOME ENVIRONMENT
146
SPLITTER
142
TV
140
SECURITY SYSTEM
138
PHONE - 2
136
PHONE - 1
136
INTERCOM
120
122
124
126
128
130
132
134
IDF
CABLE JUNCTION BOX
104
PSTN/TELEPHONY SERVICE PROVIDER - 1
106
PSTN/TELEPHONY SERVICE PROVIDER - 2
108
SECURITY INTERCOM
110
CATV
112
SECURITY SYSTEM
ACCESS CONTROL
114
ENERGY MANAGEMENT SYSTEM
116
CCTV
118
OTHER SERVICES

FIG.1

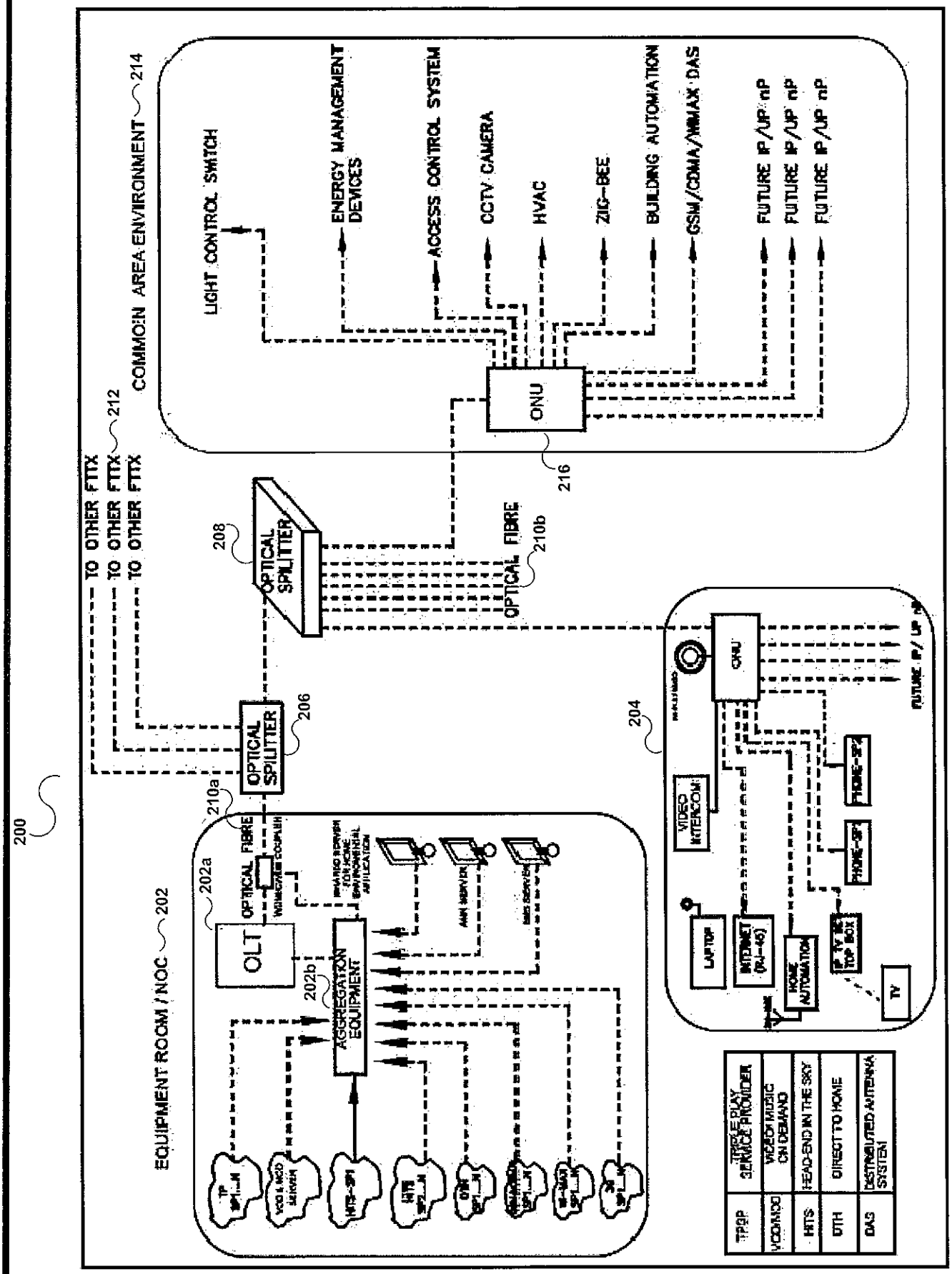

200
EQUIPMENT ROOM / NOC
202
202a
OLT
OPTICAL FIBRE
202b
AGGREGATION EQUIPMENT
210a
OPTICAL SPLITTER
206
TO OTHER FTTX
TO OTHER FTTX
TO OTHER FTTX
212
COMMOIN AREA ENVIRONMENT
214
LIGHT CONTROL SWITCH
ENERGY MANAGEMENT DEVICES
ACCESS CONTROL SYSTEM
CCTV CAMERA
HVAC
ZIG-BEE
BUILDING AUTOMATION
GSM/CDMA/WIMAX DAS
FUTURE IP/UP nP
FUTURE IP/UP nP
FUTURE IP/UP nP
ONU
216
208
OPTICAL SPLITTER
OPTICAL FIBRE
210b
204
ONU
VIDEO INTERCOM
PHONE-SIP
PHONE-SIP
LAPTOP
INTERNET (DSL-4G)
HOME AUTOMATION
IP TV SET TOP BOX
TV
TP3P
TRIPLE PLAY SERVICE PROVIDER
VOD/MOD
VIDEON MUSIC ON DEMAND
HITS
HEAD-END IN THE SKY
DTH
DIRECT TO HOME
DAS
DISTRIBUTED ANTENNA SYSTEM

FIG.2

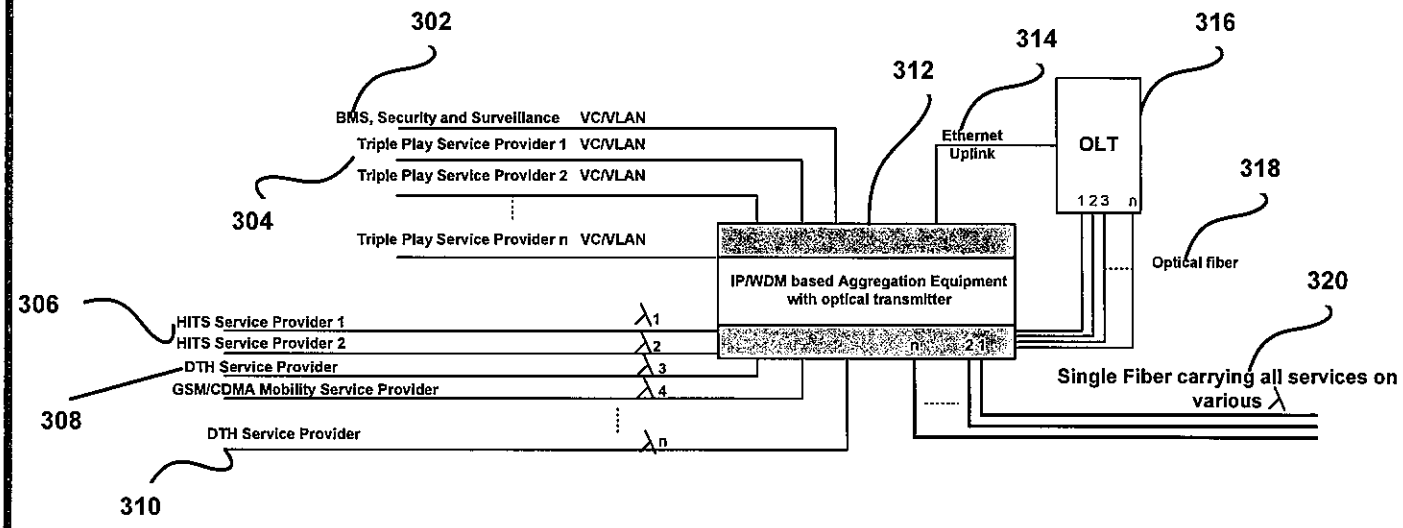

302
314
316
312
BMS, Security and Surveillance VC/VLAN
Triple Play Service Provider 1 VC/VLAN
Triple Play Service Provider 2 VC/VLAN
304
Triple Play Service Provider n VC/VLAN
Ethernet Uplink
OLT
1 2 3 n
318
Optical fiber
IP/WDM based Aggregation Equipment with optical transmitter
306
HITS Service Provider 1
HITS Service Provider 2
DTH Service Provider
GSM/CDMA Mobility Service Provider
308
DTH Service Provider
310
320
Single Fiber carrying all services on various λ

FIG. 3

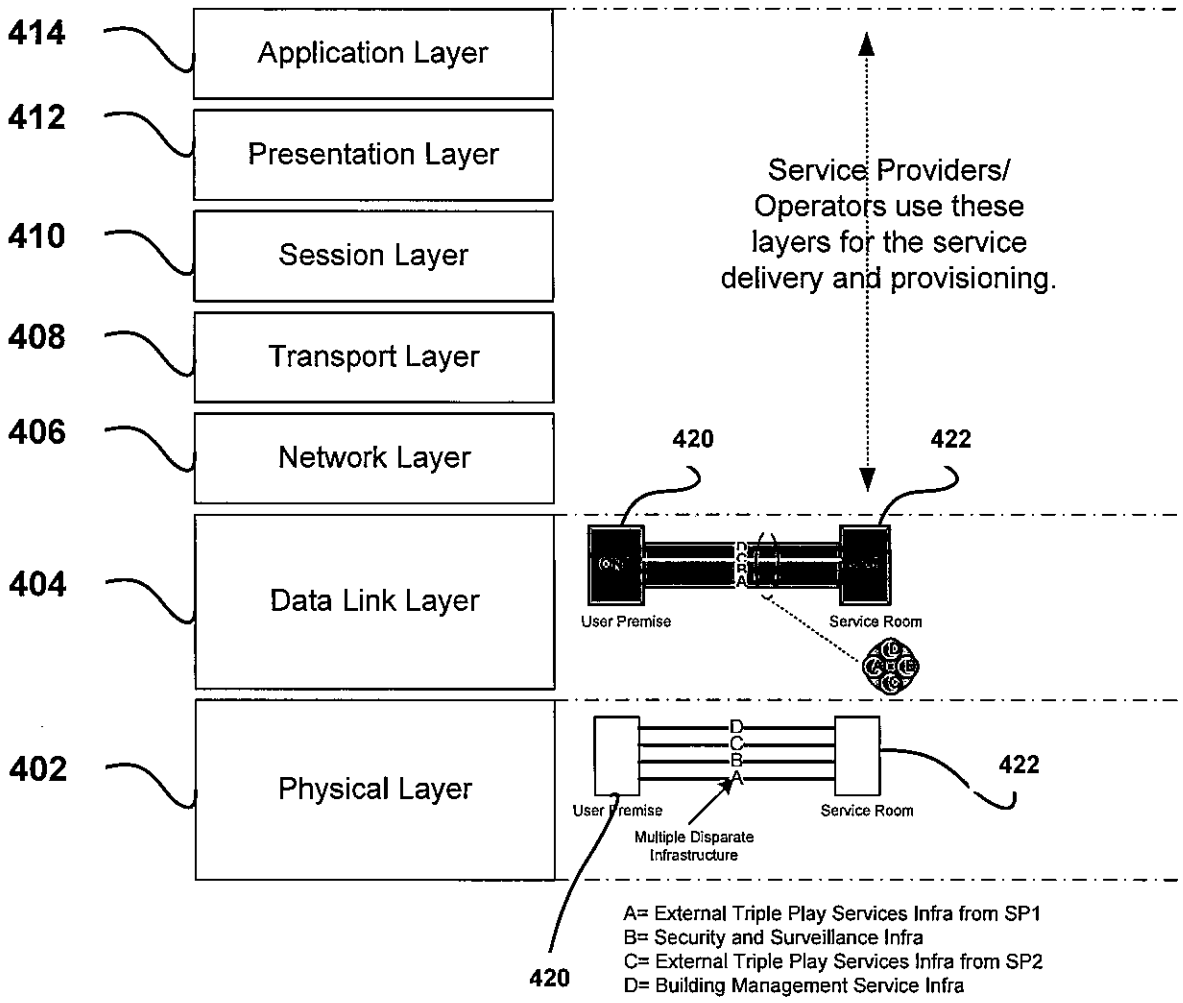

414
Application Layer
412
Presentation Layer
410
Session Layer
408
Transport Layer
406
Network Layer
404
Data Link Layer
402
Physical Layer
Service Providers/
Operators use these
layers for the service
delivery and provisioning.
420
422
D
C
B
A
User Premise
Service Room
Multiple Disparate
Infrastructure
A= External Triple Play Services Infra from SP1
B= Security and Surveillance Infra
C= External Triple Play Services Infra from SP2
D= Building Management Service Infra

FIG. 4

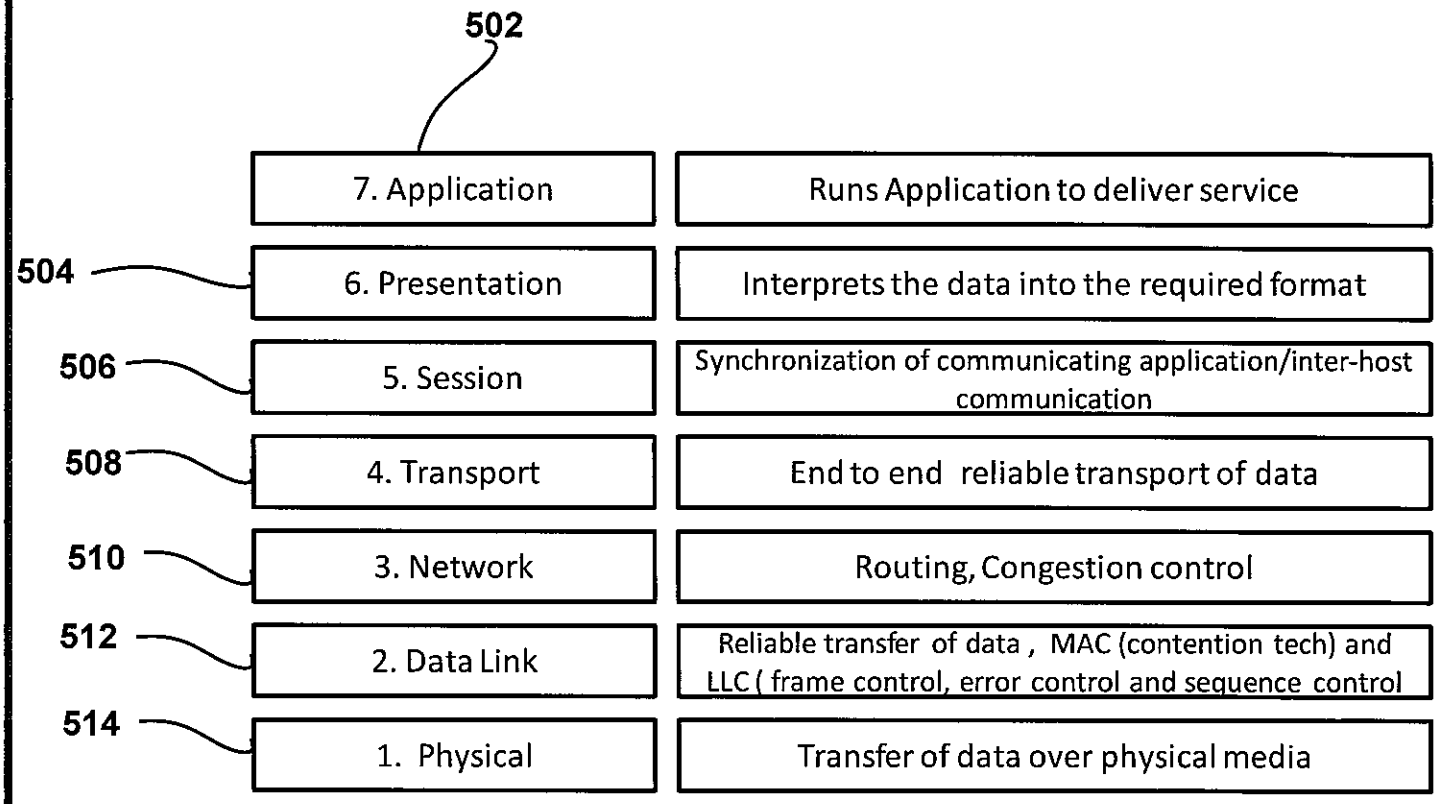

502
7. Application
Runs Application to deliver service
504
6. Presentation
Interprets the data into the required format
506
5. Session
Synchronization of communicating application/inter-host communication
508
4. Transport
End to end reliable transport of data
510
3. Network
Routing, Congestion control
512
2. Data Link
Reliable transfer of data , MAC (contention tech) and LLC (frame control, error control and sequence control
514
1. Physical
Transfer of data over physical media

FIG 5

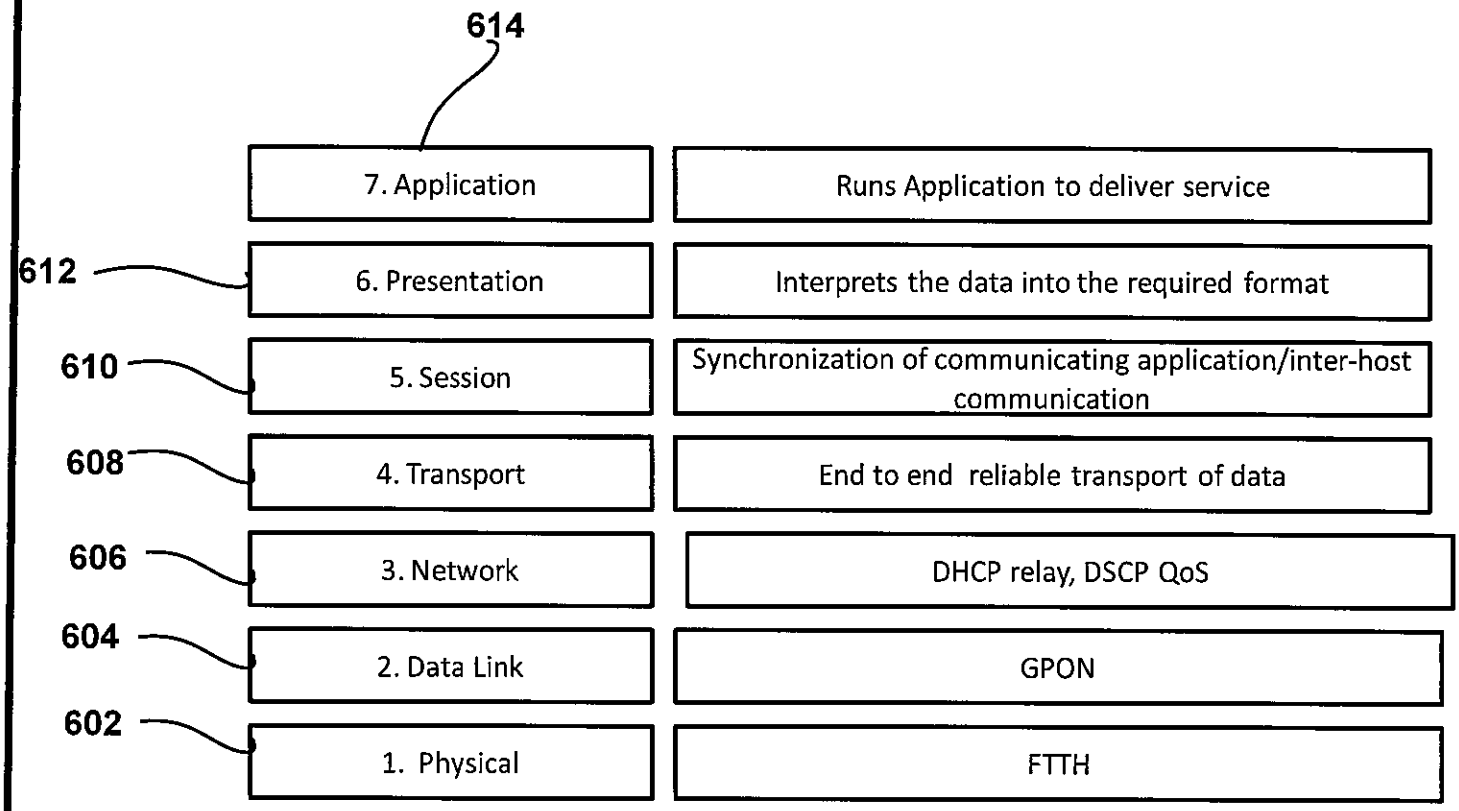

614
7. Application
Runs Application to deliver service
612
6. Presentation
Interprets the data into the required format
610
5. Session
Synchronization of communicating application/inter-host communication
608
4. Transport
End to end reliable transport of data
606
3. Network
DHCP relay, DSCP QoS
604
2. Data Link
GPON
602
1. Physical
FTTH

FIG 6

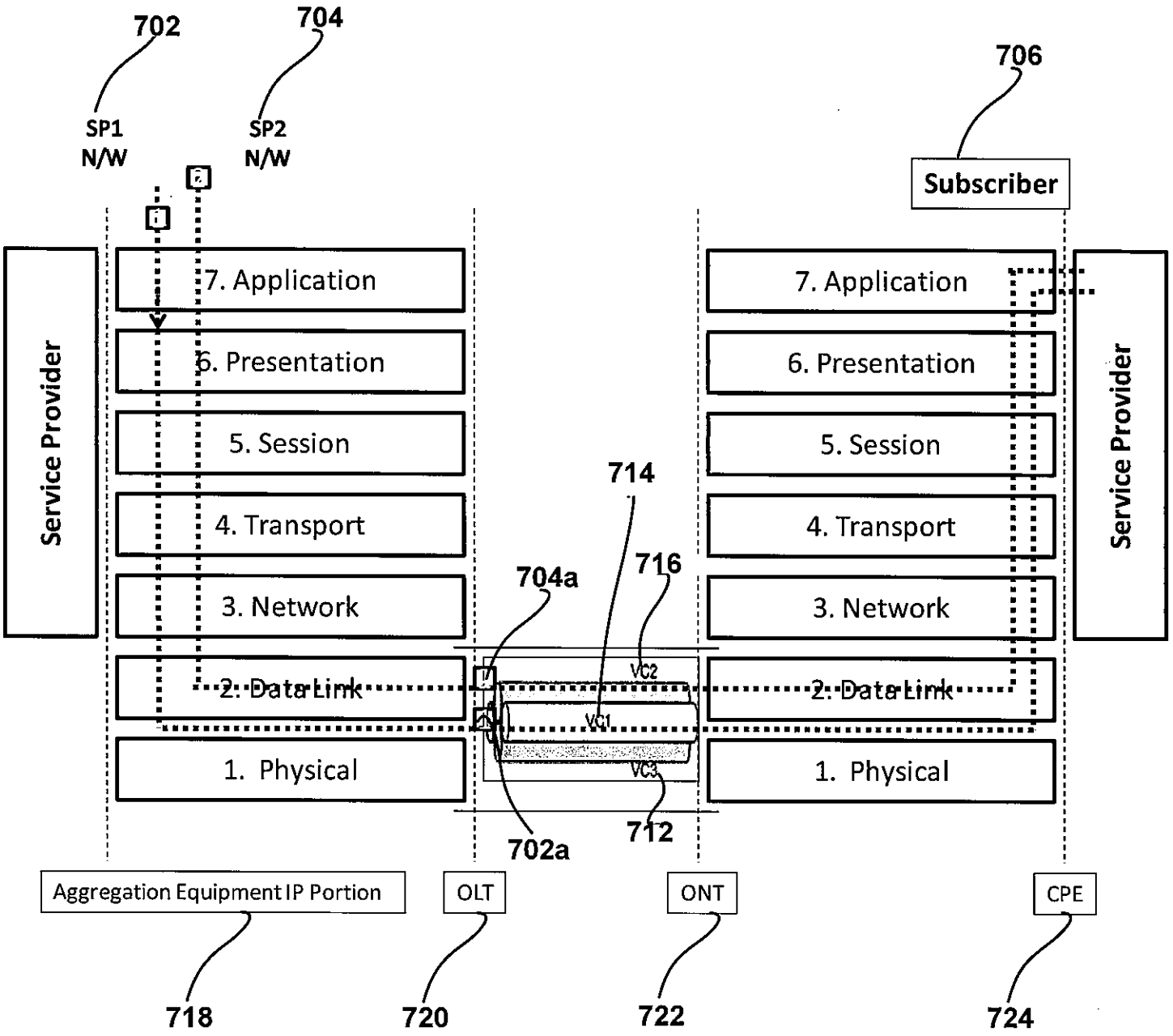
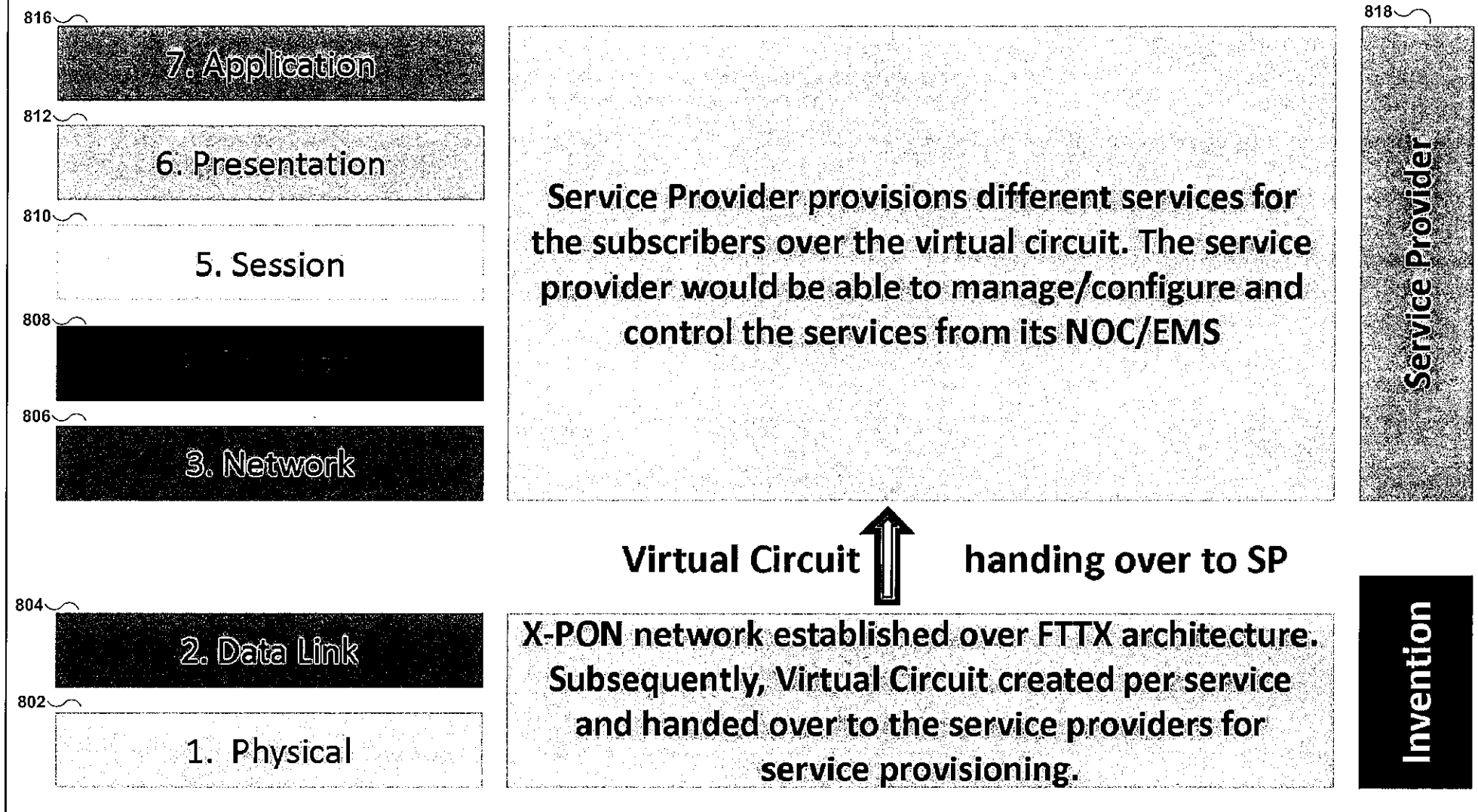

702
704
706
SP1 N/W
SP2 N/W
Subscriber
Service Provider
7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical
714
704a
716
VC2
VC1
VC3
712
702a
Aggregation Equipment IP Portion
OLT
ONT
CPE
718
720
722
724

FIG 7



SP : Service Provider
NOC : Network Operation Centre
EMS : Element Management Software

FIG.8

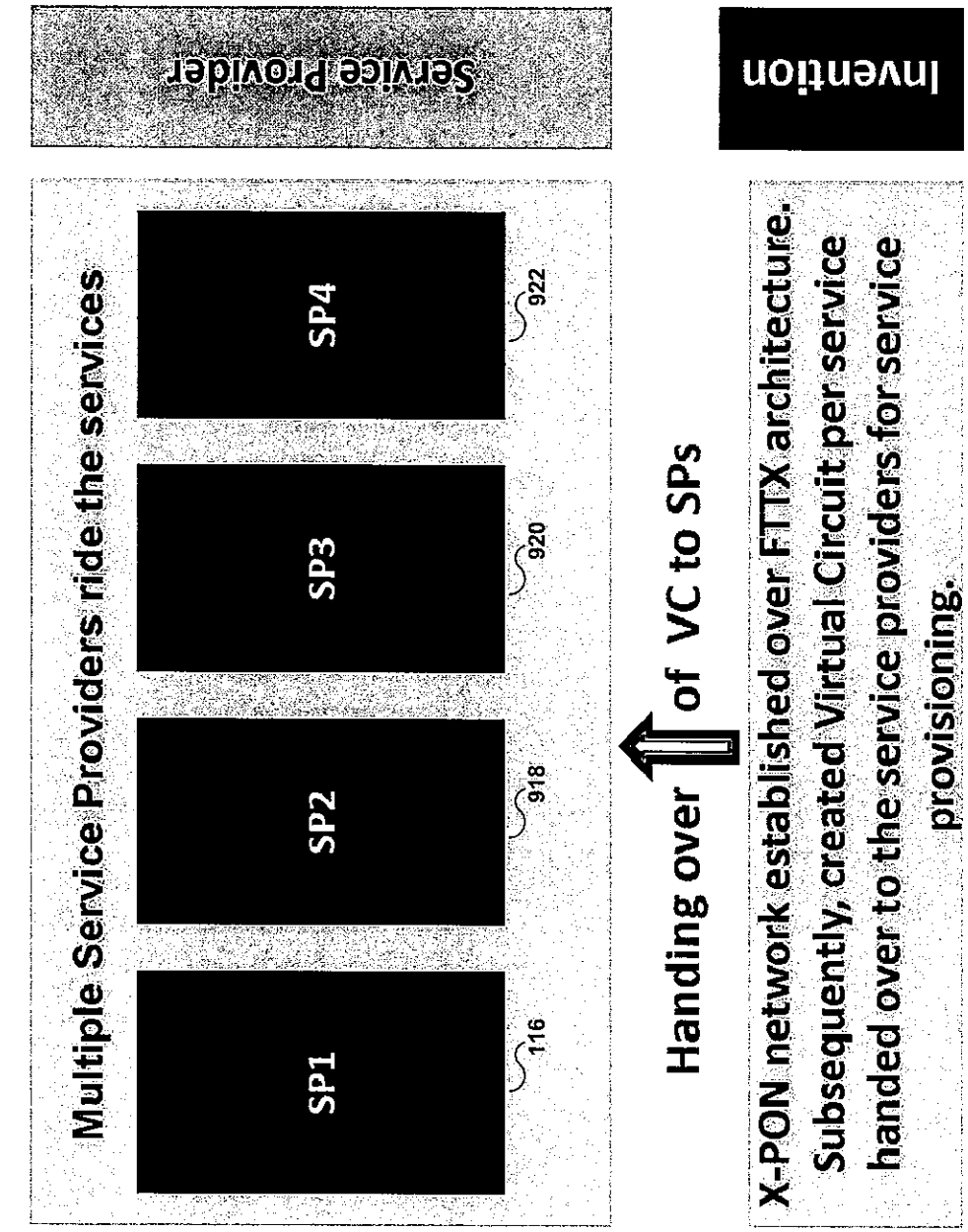

Service Provider
Invention
Multiple Service Providers ride the services
SP1
SP2
SP3
SP4
116
918
920
922
Handing over of VC to SPs
X-PON network established over FTTX architecture.
Subsequently, created Virtual Circuit per service
handed over to the service providers for service
provisioning.
7. Application
6. Presentation
5. Session
3. Network
2. Data Link
1. Physical
914
912
910
908
906
904
902
SP : Service Provider
VC : Virtual Circuit

FIG.9

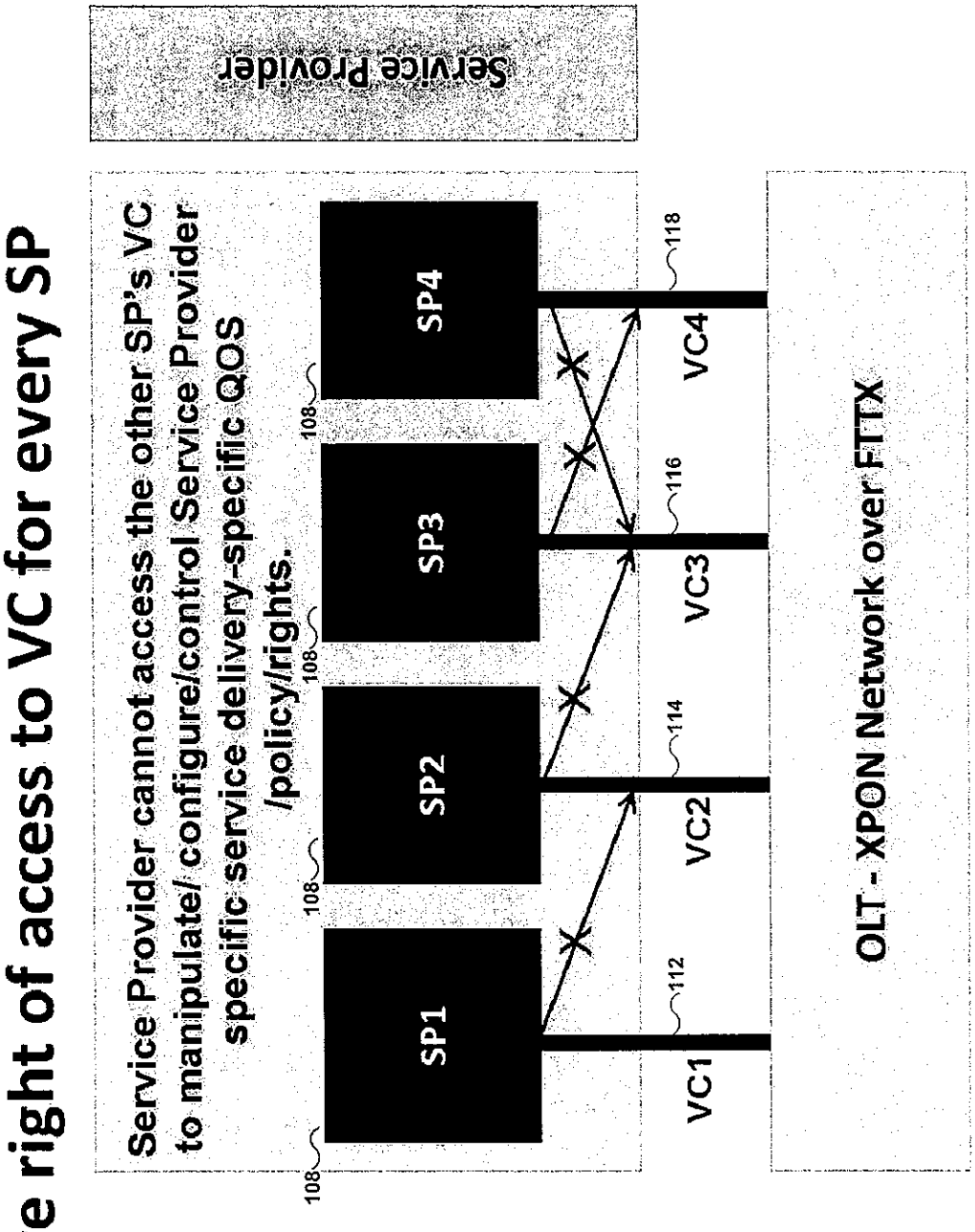
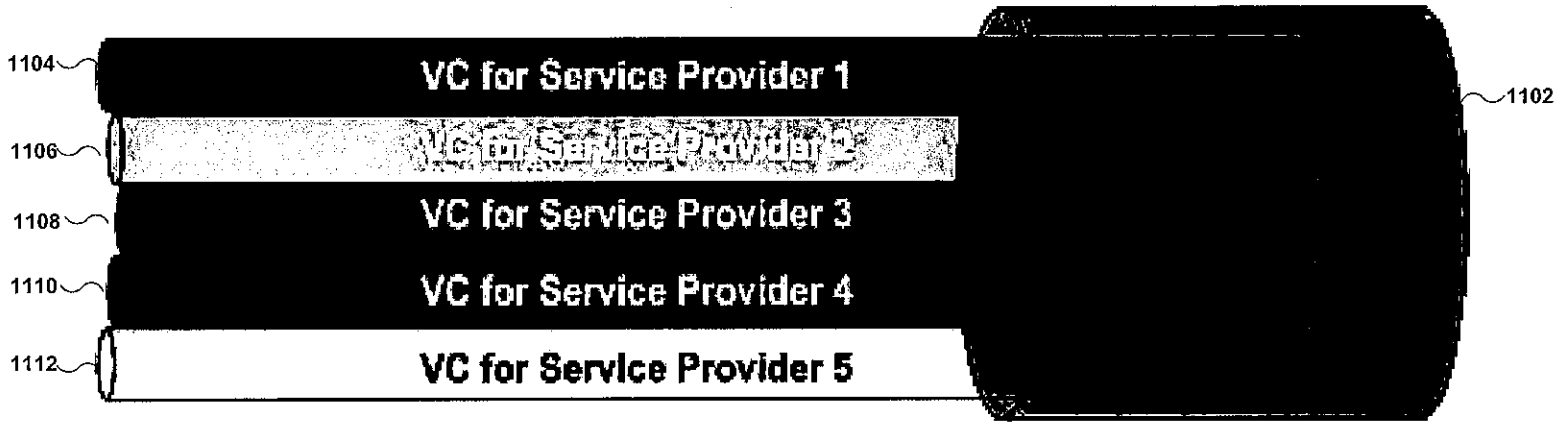
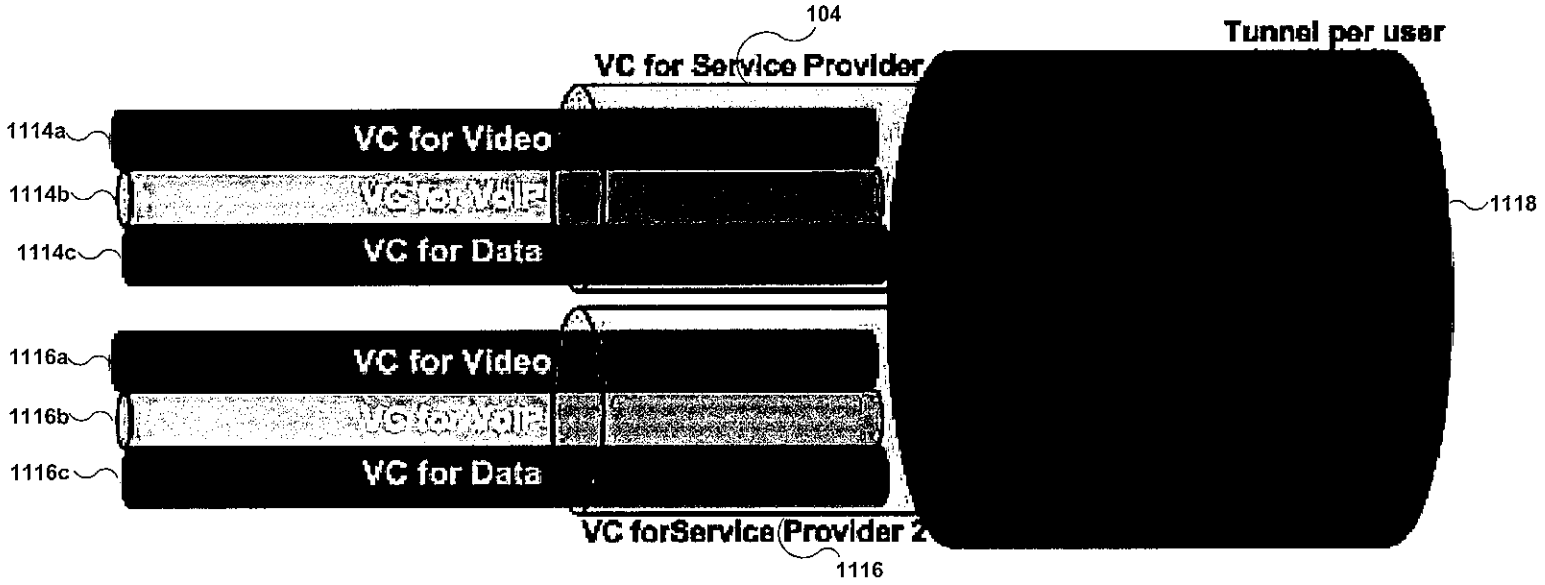

Exclusive right of access to VC for every SP
Service Provider
Service Provider cannot access the other SP's VC to manipulate/ configure/control Service Provider specific service delivery-specific QOS /policy/rights.
SP1
SP2
SP3
SP4
108
108
108
108
VC1
VC2
VC3
VC4
112
114
116
118
OLT - XPON Network over FTTX
QOS : Sequence/ Access priority of Services

FIG.10

Virtual Circuit for each Service Provider



Each Tunnel can have multiple SP VCs



Each Tunnel can have multiple SP VCs providing multiple services

FIG.11

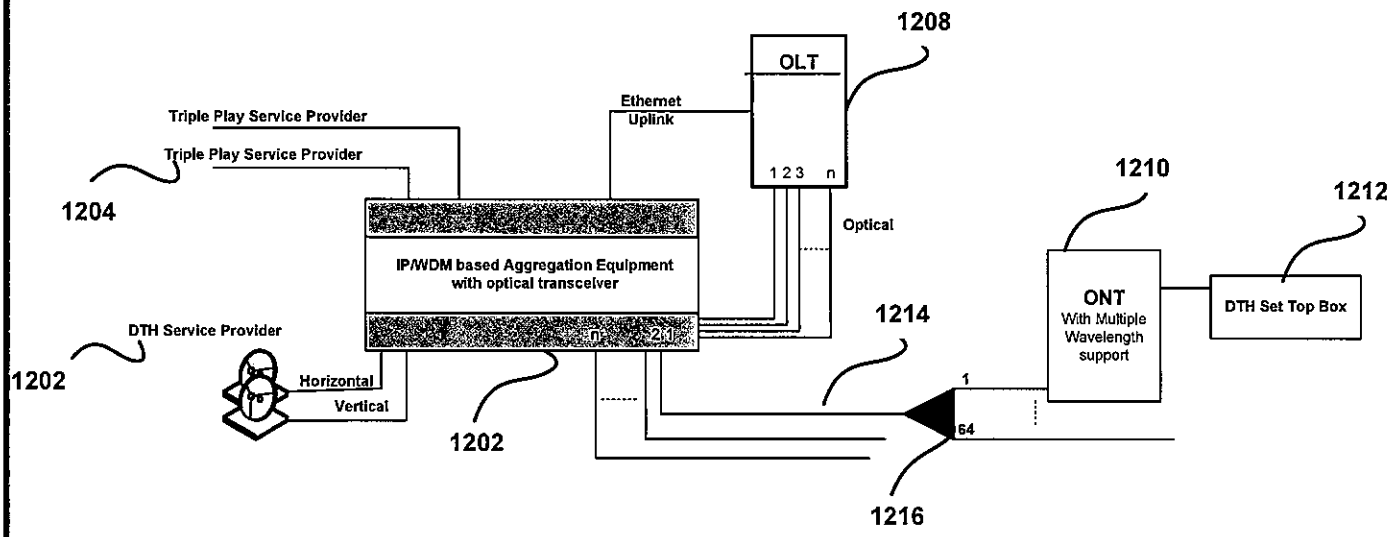

1208
OLT
Ethernet
Uplink
Triple Play Service Provider
Triple Play Service Provider
1204
1 2 3 n
1210
1212
Optical
IP/WDM based Aggregation Equipment
with optical transceiver
ONT
With Multiple
Wavelength
support
DTH Set Top Box
1214
DTH Service Provider
1202
Horizontal
Vertical
1
64
1202
1216

FIG. 12

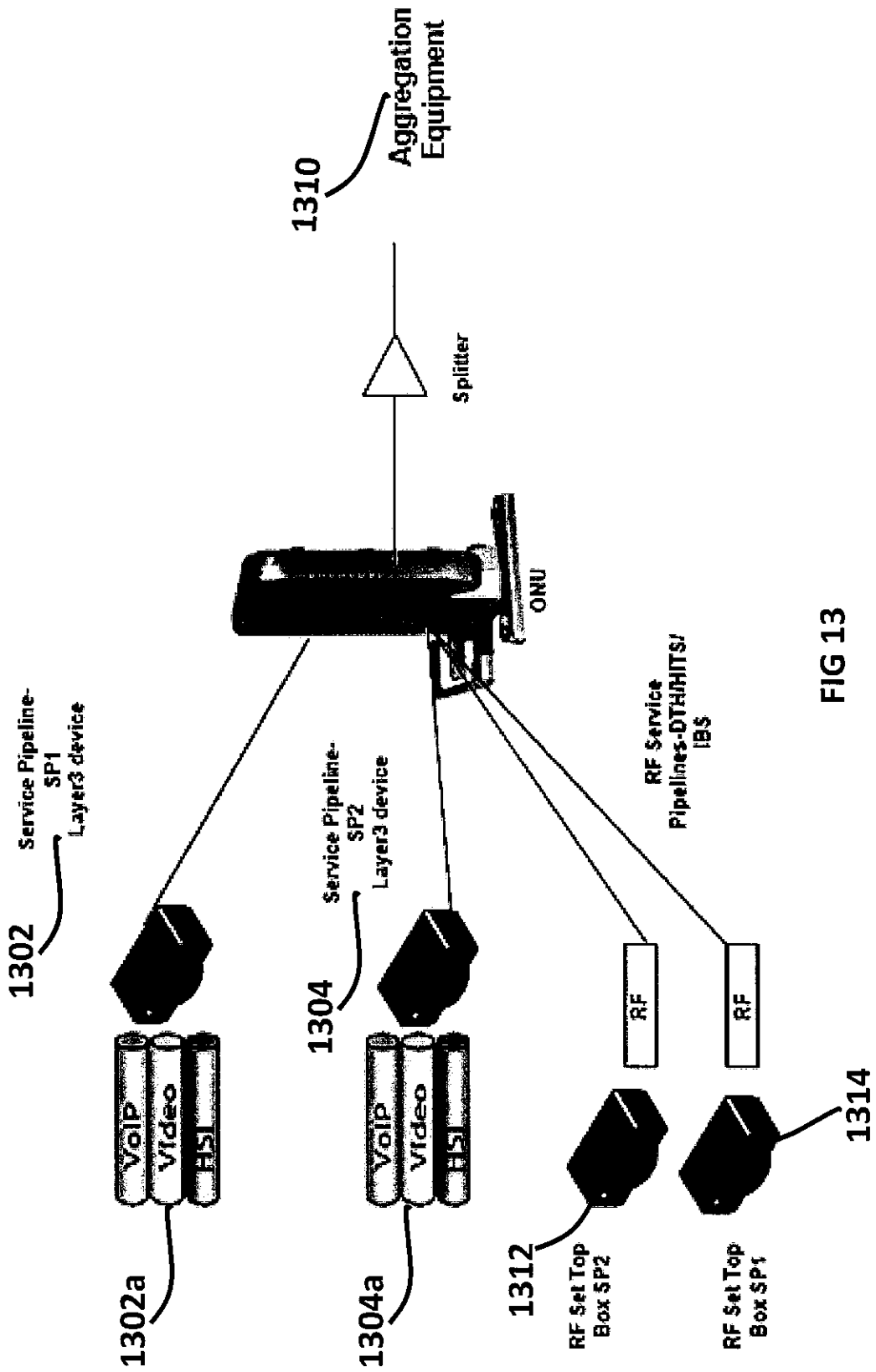

1310
Aggregation Equipment
Splitter
ONU
1302
Service Pipeline-SP1 Layer3 device
1304
Service Pipeline-SP2 Layer3 device
RF Service Pipelines-DTH/HITS/IBS
VoIP
Video
HSI
RF
1302a
1304a
1312
RF Set Top Box SP2
RF Set Top Box SP1
1314

FIG 13

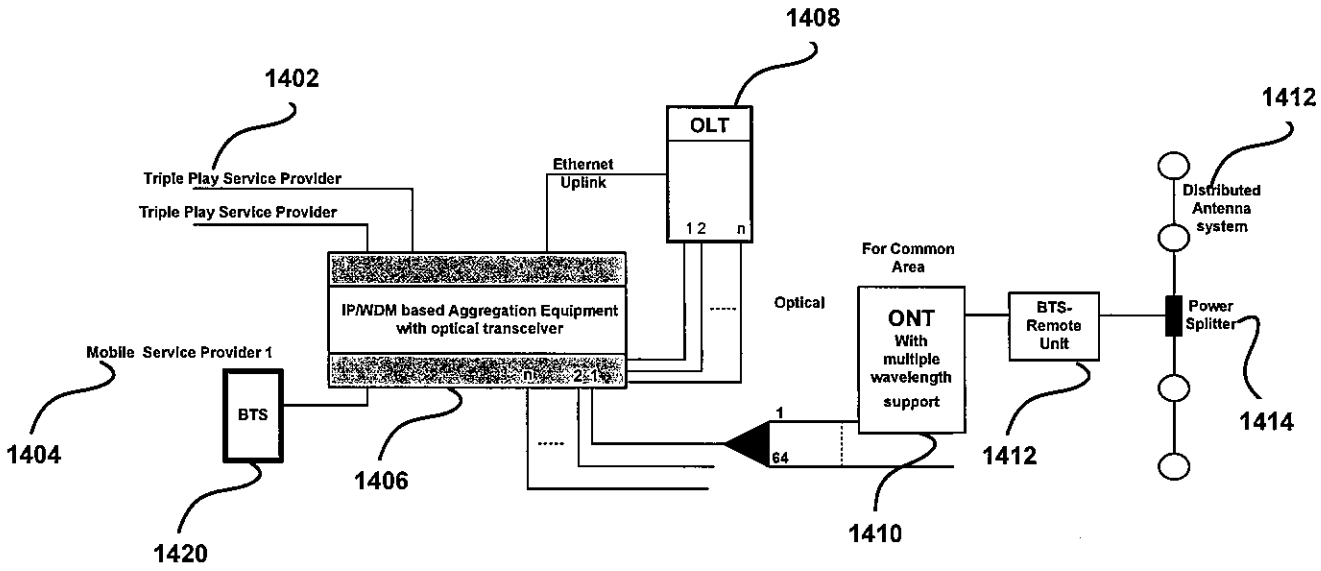

1408
1402
1412
OLT
Ethernet
Uplink
Triple Play Service Provider
Triple Play Service Provider
1 2 n
For Common
Area
Optical
IP/WDM based Aggregation Equipment
with optical transceiver
ONT
With
multiple
wavelength
support
BTS-
Remote
Unit
Distributed
Antenna
system
Power
Splitter
Mobile Service Provider 1
BTS
1
64
1404
1406
1412
1414
1410
1420

FIG. 14

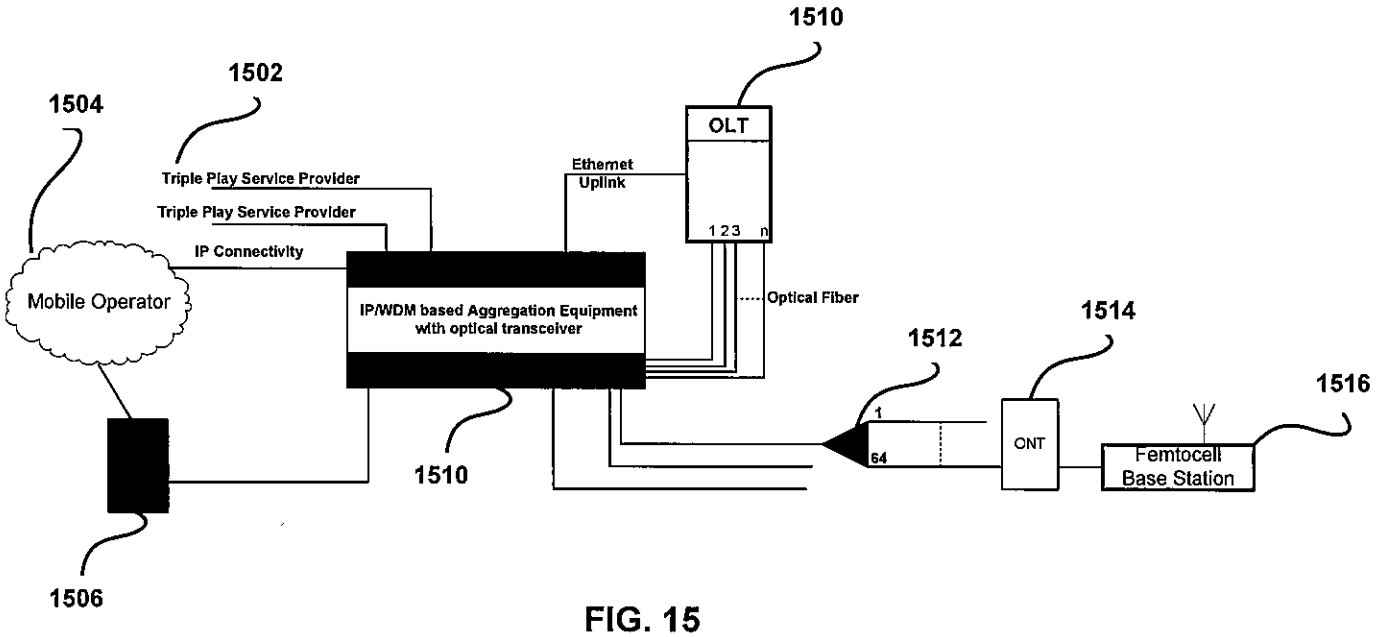

1510
1502
1504
OLT
Ethernet
Uplink
Triple Play Service Provider
Triple Play Service Provider
IP Connectivity
1 2 3 n
Mobile Operator
IP/WDM based Aggregation Equipment
with optical transceiver
Optical Fiber
1514
1512
1516
1
64
ONT
Femtocell
Base Station
1510
1506

FIG. 15

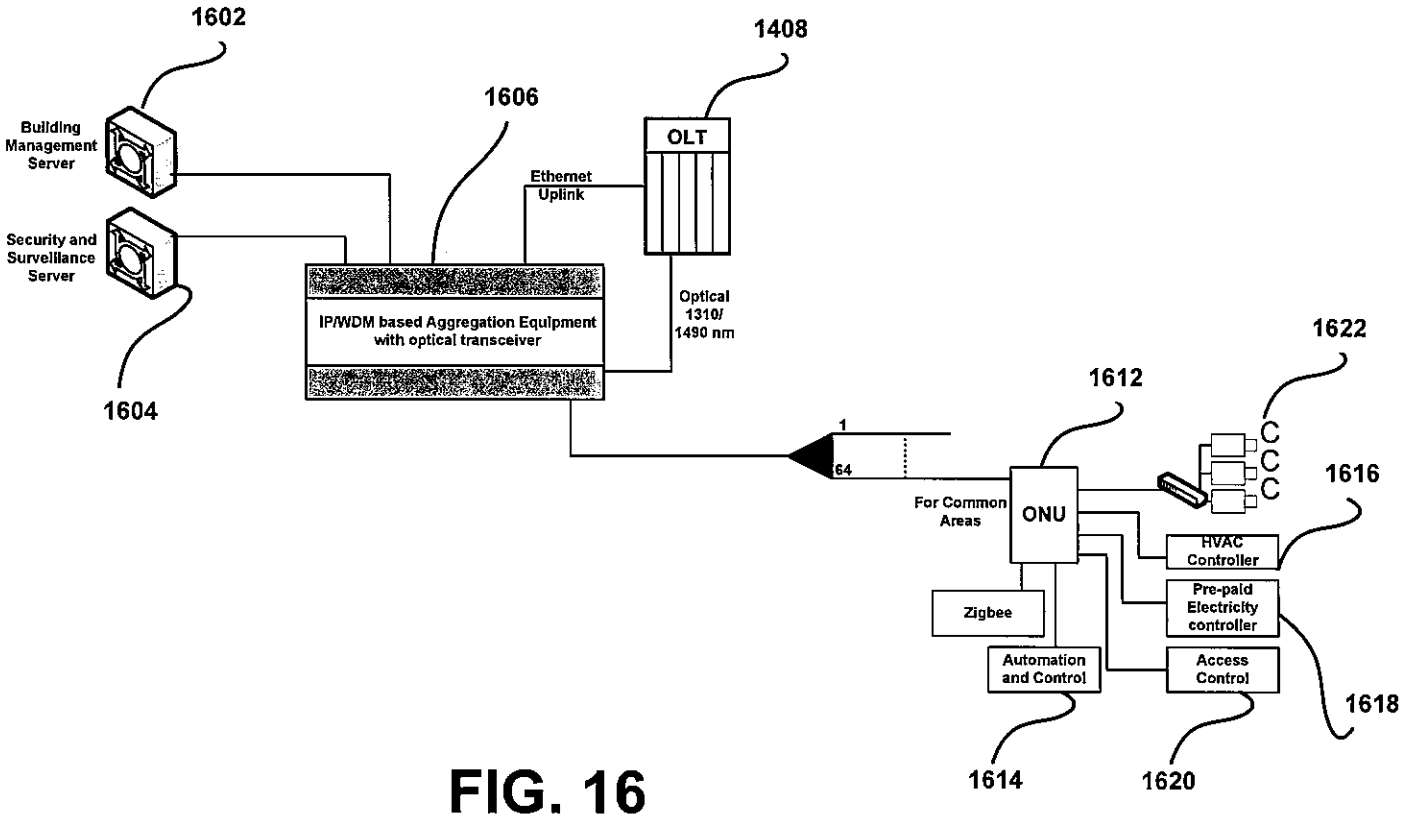

1602
1408
1606
Building Management Server
Security and Surveillance Server
Ethernet Uplink
OLT
IP/WDM based Aggregation Equipment with optical transceiver
Optical 1310/ 1490 nm
1604
1622
1612
1
64
For Common Areas
ONU
1616
HVAC Controller
Pre-paid Electricity controller
Zigbee
Automation and Control
Access Control
1618
1614
1620

FIG. 16