

METHOD AND SYSTEM FOR INTEGRATING PLURALITY OF BUILDING MANAGEMENT SERVICES AND HOME AUTOMATION SERVICES WITH PLURALITY OF MULTI-PLAY SERVICES ON NEUTRAL ACCESS NETWORK OPERATIONS BASIS

This Invention relates to Method and System for Integrating Plurality of Building Management Services & Home Automation Services and other services including Multi-Play Services of plurality of carriers' communication services (wire line and wireless) including Voice, Video and Data on Active and/or Passive Optical Network and/or Copper Network for Neutral Access Network Operations

FIELD OF INVENTION:

This invention relates to estate related (including residential, commercial, educational, governmental and mixed usage) building management services in particular and similar services for other applications, where users have interest into varied services. The services needed by users are broadly of three types.

One is the service extended by outside service-providers like basic telephony, high speed internet, broadcast television, and on-demand multimedia contents. There are various competing service-providers having their own unique sales proposition to meet the specific need of users. Not only this, due to spread of broadband, various essential services are getting popular like telemedicine, distance education, video chatting, social networking, e-newspaper, e-mails, data sharing and personal websites etc.

Another type of services are in-building services ranging from community surveillance system, community security system, access control system, visitor/guest identification system, vehicle management system, emergency announcement system, public address system, automated utility meters reading and control systems etc.

Apart from the services as mentioned above, there is a growing demand of remote home automation, remote home control, remote home monitoring and activation and deactivation of various gadgets inside the home environment inter-alia.

The field of invention is a method and system to bring all such existing and future services on a single Communication infrastructure where relationship between plurality of users and plurality of respective service-providers of multiple services remains intact and the infrastructure described in this invention acts as a mere facilitator between the end-user and the service-provider, thereby empowering end-users to chose competitive services in terms of quality, delivery and price from various service-providers and resulting in significant capital

and recurring expenditure, bringing down the cost of delivery and enabling the end-users to enjoy the benefits of lower cost of delivery through reduced price levels.

BACKGROUND OF THE INVENTION:

Separate infrastructure for carrying Building Management Services (BMS) including CCTV (Closed Circuit Television), HVAC (Heat, Ventilation and Air Conditioning), Access control, automated utility meters reading and control systems inter-alia and separate infrastructure for last-mile connectivity for carrying Information Communication Technology (ICT) services (dedicated or shared) entails heavy expenditure – capital as well as recurring, by the Service-Providers and Property Owner/Developer.

Use of remote monitoring and control applications (Enabled Home in case of a residential use and plethora of applications for commercial and miscellaneous application)) entails further investment by the end-user. Increasingly growing requirement of broadband, bandwidth and value added services coupled with the ever-increasing requirements of new-age tech-savvy digital native, a solution is desirable for convergence of all services whether ICT services, building management services or relating to enabled home at the cheapest possible cost.

Drawing 1 depicts the typical multiple infrastructure, presently followed to meet the requirement of services by the end-users. This seriously lacks in accommodating any future services. Furthermore, the conventional infrastructure is prone to degradation, multiple failure and low availability in terms of uptime. Also, the typical service infrastructure layout restricts the choice of end-users regarding the future services and service-providers as prediction of future technology and service-provider can not be anticipated at the time of development or construction of such estates.

Furthermore, it is impractical as well as impossible to predict the future of technology. Also, such multiple infrastructures involves huge sum of money by each service provider by way of capital expenditure and recurring expenditure. Such investment by multiple service providers in multiple parallel infrastructures is recovered from users of such services, thereby making

the usage charges to the customer very high, thus making the entire proposition between the service provider and end-users un-economical..

With such a paining situation for new age tech savvy digital native, a methodology of convergence solution has been invented to address the current need as well as future need of the services and service provider.

While going through the descriptions onward the technical invention and novelty will be obvious to the people ordinary in the art. ,Apart from being commercially competitive leading to cost saving the most critical aspect of the invention is it's power in addressing and solving all the in-building communication related woes of all the stakeholders like Real estate developers, Home owners, Building automation service providers, and triple play service providers competing to excel into their overall performance.

Drawing 1 clearly shows that more services means more need of setting-up new infrastructure and setup of new infrastructure means more expenses. This also incurs damage to the overall looks and appearance of the building and an un-economic proposition between all the stakeholders.

The present invention as described is not only financially viable proposition but also is able to address the current need as well as future need of the end-users, services and service providers, without any restriction.

SUMMARY OF THE INVENTION

In the light of the above described problems and shortcomings as well as others, various exemplary embodiments according to this invention provide

(1)Method and system for providing Multi-play Services (2) Provisioning of broadband services, high-speed Internet access and television, telephone, wireless communication and such like communication services) of multiple service-providers (whether wireline or (3)wireless, using one or more of GSM-Global System of Mobile

Communication, CDMA-Code Division Multiple Access, Wimax-Worldwide Interoperability for Microwave Access, GPS-Global Positioning System etc.) – whether based on (4) ATM (Asynchronous Transfer Mode), TDM (Time-Division Multiplexing), TCP-IP (Transmission Control Protocol-Internet Protocol), RF Overlay (Radio Frequency Overlay), WDM (Wavelength Division Multiplexing) or DWDM (Dense Wavelength Division Multiplexing) using multiple wavelengths of light on a single fiber, Ethernet and such like, using xPON (any enabling Technology for Passive Optical Network such as APON, BPON, GPON, EPON, GEAPON) technology and/or RF (Radio Frequency) technology or any combination of one or more of them, on a single point-to-multipoint optical fibre network system on shared-use basis; and (5) shared use of the same optical fibre network system for carrying to-and-fro data and signals – whether TCP-IP, Ethernet, RF Overlay and such like, intended generally for use in Building Management Systems including Surveillance Systems, CCTV, HVAC, Access Control, automated utility meters reading and control systems, automated utility meters reading and control systems inter-alia; and (6)synergising remote monitoring and control applications, used generally for enabled/ smart/ connected home services and value added services using any one or more of GSM, CDMA, Wimax, GPS, Femtocell (Access Point Base Station), Zigbee etc. with the same Optical Fibre network through the ONU (Optical Network Unit) based on TCP-IP, Ethernet, RF Overlay protocols and such like.

DESCRIPTION OF THE INVENTION WITH ACCOMPANYING DRAWINGS

The methods and systems of embodiments of the present invention provide successive coupling of VLAN (Virtual Local Area Network)/VCs (Virtual Circuits)/PVC (Permanent Virtual Circuits)/ PW (Pseudo Wire) in various OSI (Open Systems Interconnection) layers connecting to an Optical Line Termination Unit (OLT) on the one end by dedicating a logical layer link as input and successive configuration of outputs of Optical Network Unit (ONU) for each service provider or the Property Owner, as the case may be and then a second logical layer dedicating another logical

link on the first layer for each kind of service by a service provider or the property owner and so on and so forth till the successive differentiation is achieved in terms of delivery of service contents whether voice and/or video and/or data while maintaining Quality of Service (QOS) for the intended class of services.

On dedicating a pair of wavelength for the IP packet based Voice, Video and Data services originating from OLT as mentioned above, the methods and systems of embodiments of the present invention also provide successive coupling of RF signals of different services and service providers on WDM coupler on separate wavelengths to be carried on a single fiber and successively decoupling and converting it back to the desired service(S) or service providers RF signal at the output port of the ONU by sending a command instruction for the intended ONU by the use of the EMS software communicating with aggregation equipment in the control room.

The Drawing 3 and 4 form the underlying principle of the invention and in further drawings along with description, the invention is elaborated including the architecture of the Invention. The core equipments in the equipment room for multiple disparate infrastructures that were earlier used for delivery of utility services, internal services, now terminates at the aggregation equipment (Drawing - 3). The Aggregation equipment is used to aggregate varied services including voice, video, data,- Triple Play service, DTH- Direct to Home, Cable Television, HITS- Headend in the sky, 3G, Wimax, GSM/CDMA from multiple service providers and also internal services like local video on demand, Building Management Services, Security and Surveillance, Automated Meter Reading, Home Automation, Remote Home Monitoring, Remote Access and other IP based services for utility application. All the above mentioned services now are provisioned over single physical optical fiber media.

With respect to IP packet based communication technology, the invention as per drawing 3, 4 and sequentially from 5,6,7,8,9,10 till 11, is a methodology of segregating the physical communication media more particularly a lit fiber into multiple virtually secure media within the lit fiber, each capable of carrying varied IP services. The virtually secure media is created over the physical media as a virtual circuit/VLAN/ Pseudowire for respective service providers and the estate owner. The progressive sequence of drawing clearly elaborates how the IP based services are configured using the present invention where the infrastructure acts merely as a neutral network without entering into the service domain of a service provider.

In the present invention to accommodate IP based services by various service providers, a single physical media fiber (dark) is laid, i.e. Layer-1, Moving up, at layer 2 logical separation (virtual dark fiber) is created for respective service provider. The logical separations happen in the present invention such that the relationship between the service provider and their subscribers are intact. Multiple IP Services from multiple service providers are provisioned

over a single physical media occupying a pair of wavelengths, one for upstream another for downstream and other RF based services are provisioned over subsequent wavelengths.

As evident in the drawings 2, 3, 4, 12 and 14 , segregation of multiple RF based services is achieved by WDM Coupler at Aggregation Equipment. Each service is provisioned over a Wavelength. WDM Coupler carries multiple RF based services on multiple wavelengths with each RF service provisioned over a separate wavelength. These multiple wavelengths are then decoded at the user end and the delivery of service happens through the ONU. It supports multiple wavelength channels through which multiple services from multiple service providers is provisioned. Through use of Element Management software, the RF port of the ONU is administered to decouple the desired RF service choose by the end-user.

The fibre architecture designed for the invention is a point to point or point to multipoint network in which the fibre components recommended between Utility room and each home is passive in nature to have more reliability and ease of deployment, although any active component can also be used as optical amplifier or repeater, forward or reverse path wavelength/s injector. The distribution component that is used to cater multiple end-users with a single fibre is optical splitter. The same optical splitter can cater to several other establishments in the vicinity. Each output fiber strand of the splitter reaches to each end-user with few fibres dedicated to common areas for utility services.

As evident in Drawing 2, 12, 13,14,15 and 16 In each user unit, ONU is connected to the Fibre entering the user unit to enable the gamut of services reach to the user riding over the fiber. Each ONU is capable of delivering IP based and RF based services inside the user-unit. The services from the respective service provider bundled over a Wavelength from the OLT reaches to the ONU and is unbundled through the respective service provider's end equipment or residential gateway(RG). The service provider RG is a layer 3 device capable of decoding the services encapsulated in the VLAN/VC/Pseudowire and delivering them to the user equipment like STB, TV,Laptop, Telephone. The ONU enables the delivery of TDM services, and wireless mobility including GSM/CDMA/WiFi and home automation on Zigbee, also.

As per drawing 2,14,15 and 16, a ONU is dedicated for common areas to deliver utility services like Building Management services, Prepaid electricity, security and surveillance, GSM/CDMA/Wifi, Announcement system and various other control systems. The end equipments for the above mentioned services are connected to the ONU that establishes communication to their respective servers for control, management and configuration. To strengthen the In building Mobility service- GSM/CDMA Distributed Antennae are also connected to the ONU.

To provide better manageability, control and to smoothen the provisioning of the services by multiple service provider, a higher layer of management is implemented to have better visibility in the operation, monitoring, and provisioning of the services by the respective service provider. The management software provides additional layer of manageability such that the administrator can manage, control and monitor the ONU-CPE, its service related and service provider related information.

In order to provision IP based service, administrator assigns the port of the ONT to the VLAN/VC/Pseudowire Identification of the specific service provider. The administrator controls and enables any one wavelength channel out of all the available channels to the ONT RF port; in order to provision RF based service-DTH/IBS/HITS/ CATV. A restricted access of the network visibility is given to the respective service provider for monitoring purposes such that only its subscriber information is visible. This enables transparency of operation and service provisioning between user and service provider.

While this invention has been described with the exemplary embodiments outlined above, to solve the most critical technical problem of a project, various alternatives, modifications, variations, improvements, and/or substantial equivalents, whether known or that are or may be presently unforeseen, may become apparent to those having at least ordinary skill in the art. Accordingly, the exemplary embodiments of the invention, as set forth above, are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of this invention in future. Therefore, the invention is intended to embrace all known or later-developed alternatives, variations, improvements and/or substantial equivalents related to the integrated infrastructure.

I claim :

1. The system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of the respective services, including building management services, building automation services, security & surveillance services and community services and/or Home automation and remote management services voice, video and data services, based on IP, TDM/ ATM/ VoIP and RF technologies, of **multiple service providers** while allowing each service provider to manage, configure and administer their respective, services, contents and end devices without change in their proprietary network management software and allowing it to carry out billing and provide necessary support services to end consumer independently, as illustrated in Drawing No. 3
2. The system and method in Claim 1 also comprises of system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of the plurality of **building management services, building automation services, security & surveillance services and community services**, based on IP and/or RF technologies, allowing each service provider to administer its respective set of end-devices through its control unit(s) and allowing it to carry out billing and provide necessary support services to end consumer independently.
3. The system and method in Claim 1 also comprises of system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of the plurality of **Home automation and remote management services**, based on IP and/or RF technologies, allowing each service provider to administer its respective set of end-devices through its control unit(s) and allowing it to carry out billing and provide necessary support services to end consumer independently.

4. The system and method in Claim 1 also comprises of system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of Multi Play Services including **voice, video and data services, based on IP, TDM/ ATM/ VoIP and RF technologies, of multiple service providers**, allowing each service provider to administer its respective set of end-devices through its control unit(s) and allowing it to carry out billing and provide necessary support services to end consumer independently.
5. The system and method in Claim 1 also comprises of system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of **Audio-Video broadcast services**, based on RF like CATV, DTH, HITS etc., of **multiple service providers**, allowing each service provider to administer its respective set of end-devices through its control unit(s) and allowing it to carry out billing and provide necessary support services to end consumer independently.
6. The system and method in Claim 1 also comprises of system and method for **sharing** of the single lit fibre, originating from the aggregation equipment and terminating at the service delivery ports of the ONU or vice versa, by creating plurality of virtually secured physical mediums within the single fibre and dedicating ports in the ONU to each such virtually secured physical medium, for to and fro transport of **Wireless services** whether based on wi-fi, GSM, CDMA or otherwise, of **multiple service providers**, allowing each service provider to administer its respective set of end-devices through its control units and allowing it to carry out billing and provide necessary support services to end consumer independently.
7. A system and method for devising integrated communication infrastructure for transporting **building management services, building automation services, security & surveillance services and community services**, and/or **Home automation and remote management services**, based on IP and/or RF technologies together with, **voice, video and data services based on IP, TDM/ ATM/ VoIP and RF technologies, of multiple service providers**, any or all of such services being wire-line or wireless, in any permutation or combination of such

services and/or service providers, on **single optical fibre** based point to multi-point, topology, to the plurality of end-consumers premises, without limiting accommodation of more number of services and service providers in the future, as described in the Drawing 2.

8. The system and method in Claim 7 also comprises of integration of one or more of **building management services, security & surveillance services building automation services and community services**, based on IP and RF technologies in any permutation or combination of such services with the **single fibre** based integrated communication infrastructure without limiting accommodation of more number of services and devices in the future, as illustrated in Drawing 2.
9. The system and method in Claim 7 also comprises of integration of one or more of **Home automation and remote management services** including but not limited to wi-fi, femto-cell, Network attached storage, secured sharing of data, home monitoring, appliance control and such like, in any permutation or combination of such services with the integrated communication infrastructure on **single fibre**, without limiting accommodation of more services and devices in the future as illustrated in Drawing No. 2.
10. The system and method in Claim 7 also comprises of integration of one or more of Multi Play Services including **voice, video and data services, based on IP, TDM/ ATM/ VoIP and RF technologies, of multiple service providers**, any or all of such services being wire-line or wireless, in any permutation or combination of such services with the integrated communication infrastructure on **single fibre** without limiting accommodation of more number of services, devices and service providers in the future, as illustrated in Drawing 2.
11. The system and method in Claim 7 also comprises of integration of one or more of **Audio-Video broadcast services**, based on RF like CATV, DTH, HITS etc., of **multiple service providers**, in any permutation or combination of such services with the integrated communication infrastructure on **single fibre** without limiting accommodation of more number of services, devices and service providers in the future, as illustrated in Drawing 2.
12. The system and method in Claim 7 also comprises of integration of one or more of Wireless services whether based on wi-fi, GSM, CDMA or otherwise, of **multiple service providers**, in any permutation or combination of such services with the