EMBEDDED SYSTEM BASED POWER CHARGER FOR OLEV

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ABSTRACT:

In this modern world, people use different kinds of vehicles for transportation. Day by day, the numbers of vehicles are increased and also the rate of fuel is also increased. Need to think for alternative energy. Electric vehicle is very economic. But it should be charged for every particular period. In long journey, it is impossible. In this project, we propose a new technology for charging vehicles in wireless manner. This project deals with an online electric vehicle (OLEV) system which utilizes the dc power system for reducing loss as well as reducing the size of the required battery capacity. The vehicle consists of two batteries while one is used for driving the vehicle, the other is in charge and vice versa. The energy transmitters are connected at the particular places. whenever the vehicles reaches near the transmitters its get the charge from the transmitter through electromagnetic waves and thus the battery in charge will be charged when the driving battery becomes empty automatically the battery is switched and the driving battery will be in charge and the charging battery will become driving battery. Thus the vehicle can be driven for long distance.

Index Terms—**Contactless powers transfer system, DC Distribution system, EVs-Electric vehicles, OLEV-Online Electric Vehicle, Wireless charging vehicle.**

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I.INTRODUCTION

The increase in the interest of energy conservation recently across industries implies to find reliable technical solutions in order to reduce the energy consumption. In the field of power systems, the concept of energy efficiency has gained a lot of attention in the past few years. Active research is being performed to find solutions for increasing energy efficiency and encouraging the implementation of distributed sources of generation near the load centres for the purpose of power loss.

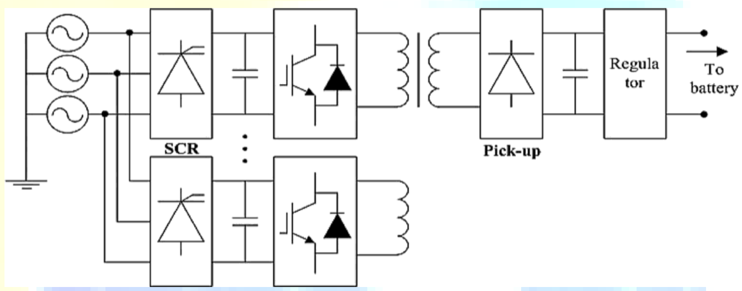

Fig.1. Configuration of the current OLEV Inverter system

Reduction and resolving environmental issues. For road transportation, the electric vehicles (EVs) have received attention since they can use energy sources other than petroleum thereby decreasing air pollution. However, the main drawback of Evs is that owing to the limited energy density of the batteries, larger requirements in battery size are required there by resulting in higher costs.

To encourage the increase in the utilization of electric vehicles, it is required to install the infrastructure for charging the Evs where the bus stop and the parking lot could also be converted into another type of place to provide the required energy. Various studies to establish this circumstance are required and among them, the increase deficiency and the reduction of the charging time are especially expected to be the main concerns.

By attention to this point, a study about wireless power transmission system for electric vehicle to charge the battery during low-speed driving without stopping the vehicle is under- way. If vehicle scan be recharged while driving, the rate of discharging will be greatly reduced and EV's battery size will reduce accordingly. The various concepts of the wireless power transmission system have been already configured, considering the efficiency and stability problem as well as harmonics impact on the system, but little research has been performed on the effective integration with the power system. In this paper, a study is performed focusing on the effective operation of the online electric vehicle(OLEV) system which is an innovative project that utilizes wireless charging for supplying energy to the EVs. Fig.1 shows a schematic of the OLEV inverter system. The OLEV system under going research utilizes a power inverter developed particularly for this system, where the 440-Vac, three-phase, 60-Hz input is converted to dc which then is converted to generate a 20-kHz ultra high frequency voltage by using insulated-gate bipolar transistor(IGBT) device.

The existing OLEV system, which is presently under the demonstration phase, is an ac supply system where the supplied ac power from the grid is converted into dc power by each inverter. Thus, the system has a large switching loss compared with other electrical transportation system such as the dc railway system. Also, since the entire charging system is located at the end of the electric power distribution system, there is a possibility of a loop occurrence when an electrical inter connected system is configured between each substation. Due to this issue, there is an efficiency problem in power supply and substation capacity calculation because only one substation system is responsible for power supply for several inverters. Fig.2 shows the concept of the OLEV system with ac power. A large peak power can occur in the substation when there is simultaneous battery charging on the charging platforms since the system is radial and does not receive power from the other substations.

In the case of OLEVs, since the capacity of the battery is comparatively low, the system cannot be configured so the EV is not charged for a long interval, i.e., the distance between the charging sections cannot be too long. Furthermore, since the system has adopted the low-speed charging section, the resistance has a large deviation depending on the location of the EV within the charging section. The main Technical weakness of EV

The limitation of the onboard energy storage and the time to recharge it. Despite of recent improvements in batteries, and real challenges for power electronics are not only the cost reduction through new system.

Many charging inverters required in the OLEV system and the system utilizing an ac source can result in the following problems.

1) First, large switching loss can occur as the system will need many power electronic devices.

2) Second, due to many power conversion processes, a lot of harmonics is generated and

Since the OLEV system is a high-frequency power transfer system, counter measures to remove these harmonics should be developed.

3) Third, the substation supplies the power without support from other substations which results in high peak power and under utilization of the substation, i.e., the capacity set for the substation is unnecessarily high due to the peak power.

In this paper, in order to minimize the losses occurring in the existing OLEV system, the dc distribution system is being proposed to enable electricity exchange between the substations similar to other dc-based transportation systems. The system configured is based on the given line information, the scheduling being performed which reflects the consumption power of the vehicle and the charging power of inverter for the efficient operation of the whole system. The operating condition of each section is verified and the state-of-charge (SOC) of the vehicle's battery is checked whether it is being maintained at an appropriate level. Also, the power flow analysis is performed to verify peak power reduction through the proposed system.

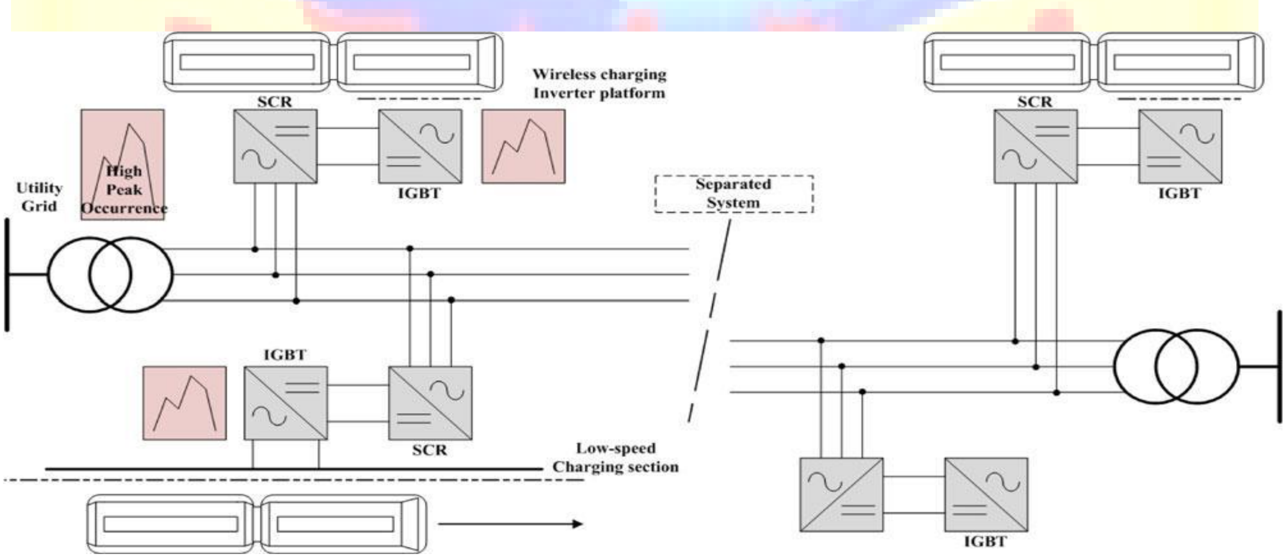

Fig.2. Concept of the OLEV system with an AC power system.

Online electric vehicle (OLEV) system which utilizes the dc power system for reducing loss as well as reducing the size of the required battery capacity. The vehicle consists of two batteries while one is used for driving the vehicle, the other is in charge and vice versa. The energy transmitters are connected at the particular places (Regular distances). Whenever the vehicle reaches near the transmitters, it gets the charge from the transmitter through electromagnetic waves and thus the battery in charge will be charged .When the driving battery is empty, automatically the battery is switched and the driving battery will be in charge and the charging battery will driving battery. Bipolar dc networks are advantageous due to higher reliability and increased power transmission capability. Due to the presence of distributed energy resources and loads with their power electronics interfaces. The traction system solution is presented, the feasibility of this electrical machine.

II. CONFIGURATION OF THE DC OLEV SYSTEM

A. OLEV System Characteristics

The OLEV system is comprised of section switch out power supply. The railway system consists of low-speed charging sections that enable the charging of battery during operation unlike other electric vehicle. Although the system shows the mobility and energy consumption.

B. Bipolar type dc distribution system

Fig.3 generally, the dc distribution system can be configured using the unipolar-type or bipolar-type inverter. In the case of the unipolar type, every component is connected directly. Between the "+" and "−" conductors. Therefore, cost is reduced due to the decrease in the number of power electronic devices. Disruption of the existing protection coordination scheme. For that reason, one substation must supply power to charging inverters.

However, the transmission capacity is smaller than the bipolar type at the same voltage level and the narrow range of choices in voltage level. In the case of the bipolar type, more power electronic devices are required but larger transmission capacity has many advantages such as a variety of voltage levels. Various studies have been performed in the field of electric vehicle by applying bipolar dc distribution systems. Here the bipolar-type dc distribution system is being considered for operation of the OLEV system.

The system is configured by using a bipolar dc system. In this system, each substation which is supplying power to the OLEV system is inter linked. Through this, each substation supplies power mutually and reduces the effect of a drastic increase of power consumption.

The OLEV charging system currently utilizes 6600V $_{ac}$ supplied from the power grid and

C. Minimize switching loss

Converts the ac power into dc power through the SCR and transmits ultra high frequency power to the charging platform through the IGBT. In the case of the ac distribution system, the SCR switching controls are required which generate switching losses during the starting phase of every charging process.

In the case of configuring a dc system by installing a rectifier substation, the system is generally configured with diode or thyristor rectifiers. In the case of a dc railway system, for example, the system uses a thyristor rectifier to supply power while providing stable voltage conditions during multi vehicle operating conditions. On the other hand, the OLEV system, only a few vehicles are required to charge at a certain point there by not requiring any special voltage compensation plan. If the system is configured with a dc diode rectifier, the switching loss involved in the dc OLEV system can be minimized. The configuration of the dc OLEV system conceptual diagram is shown in Fig.4.

D. Peak Power Reduction

When the OLEV system is configured with a dc supply system, it is possible to mutually supply the power supply through the integrated substation in contrast with ac power system. Currently, in the ac system being studied, the link between each substation is not possible due to protective relaying problems or the occurrence of a loop. Therefore, for the power supply of the charging inverter, only one substation, which is directly connected to the inverter, is available. For this reason, the system operation is not possible in the case of faults in the substation side. High-peak power could also occur during simultaneous charging in the nearby charging inverter. If the dc system is configured using the diode rectifier, the current flow into the power grid is blocked by the rectifier. Thus, the inter-connected system at the end of the grid is possible. Also, the voltage drop due to the low-voltage system can be improved considerably due to reduction in current flow on each feeder.

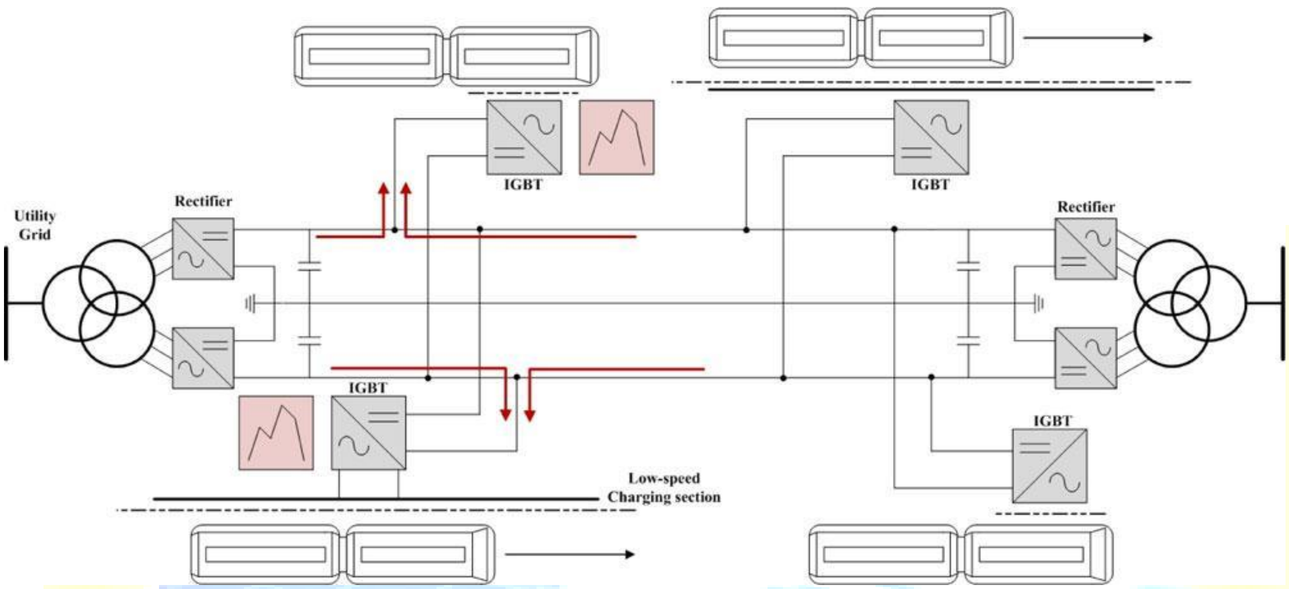

Fig.3 Concept of the OLEV system with a DC power system.

E. Improvement of Capacity Efficiency and Cost Reduction

For an existing ac OLEV system, the substation capacity should be calculated by considering the maximum expected output of all the linked charging inverters. Also, due to the occurrence of peak power consumption, the scheduling of EVs is difficult since simultaneous charging should be avoided. However, in a dc OLEV system, the formula used, which optimizes the peak power reduction, to calculate the substation capacity for electric railway systems can be applied for calculating the substation where the peak power is considered in the substation capacity calculation rather than summing up the capacity of all the linked charging inverters in the ac.The power supply and substation capacity estimation in the dc system is being calculated more efficiently by reflecting the EV movement characteristics and pattern of power supply according to location. Furthermore, this capacity calculation formula can be applied to derive the optimal rectifier capacity for the dc OLEV system in order to replace the rectifiers in each charging point. This results not only in the reduction of the number of power electronic devices but also in the reduction of

The total capacity and cost of the rectifiers required in the OLEV system which is an important factor in implementing the OLEV system in the urban distribution system.

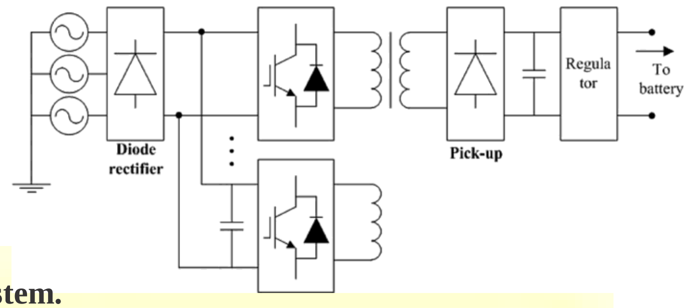

Fig.4. Configuration of a dc OLEV inverter system.

III.EXPERIMENTAL RESULT:

The wireless power transmission systems for EVs to charge the battery during low speed driving through mutual induction the vehicle get charged. The basic formulas for the vehicle movement and position as shown in (1) and (2) are being utilized for the basis of this formulation:

$$v(t) = v_0 + at \qquad (1)$$

$$x(t) = 1\,at^2 + v_0\,t + x_0 \,. \qquad (2)$$

IV. CONCLUSION

The proposed algorithm in this paper, the system is configured by using the given input data and the system operation by checking the SOC of the operating vehicle which is being verified for operability. In this process the scheduling process and the efficiency of power supply through power flow analysis when applying the dc distribution system are being verified. Based on the proposed the system is configured by using the given input data and the system operation by checking the SOC of the operating vehicle which is being verified for operability. Through the scheduling process, which is more complex in Ac systems, the generation of peak power is reduced and through the mutual power supply from each substation the stable and efficient operation of the dc OLEV system is being confirmed.

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