

## IOT BASED RADIATE FOR HIGH QUALITY BROADBAND CONNECTIONS IN HIGH SPEED TRAINS

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### ABSTRACT

Internet users are increasing tremendously in day to day scenario. Despite of the internet users in urban areas, the proportion of internet usage in urban areas are also in increasing range. The internet based applications and services have found explosive growth and people rely on internet for their daily life. Due to advancement in wireless communication systems, high speed wireless networks connect both trains and passengers to the Internet. Hence there is a demand for providing Broadband internet services for the users in High speed trains and also smart information related to the passengers in the train. The modified solution of RADIATE (RADio-over-fiber as AnTenna Extender) using IoT (Internet of Things) has been proposed to provide high speed communication. IoT connectivity features provide the speed and scalability that is needed to process millions of messages from millions of devices. IoT management features help us in provision, monitor and update devices and manage users and minimize the complexity of connected sources. Hence Internet of Trains with Radiate has been proposed to enable the users to actively use the internet in high speed as well as to get the smart information's related to the journey at that instant in high speed train to make the ease of access. And also the handover problems are solved to an extent and also provides constant channel to the requested users efficiently. Thus the cost effective and high quality of broadband internet services is provided in high-speed trains. This also provides the safety and effective connectivity which includes high security.

**Keywords:** High speed train communication, RADIATE, cost effective, high quality, Smart information, Internet of Trains.

### I. INTRODUCTION

The rapid development of the technology and economy has made the abrupt growth of internet connections all over the world. This leads to the sudden changes in wireless communication technology. Initially the internet connections are provided in wired connections. Then based on the need of users wireless communication have been introduced. The connections were provided to the users through the cellular network that comes under radio based technology at initial stages. Base stations (BS) are used to transmit and receive using the assigned spectrum. They also evolved as generations and currently often used is third generation (3G) which supports high speed cellular connections for voice as well as video based telephone systems. Broadband connections are extensively used in increased traffic for the purposes such as online multimedia, gaming, mobile application downloading etc.

Recently, trains have become the major mode of transportation and people are expecting internet connections while this travel. 75% of passengers in the trains are the business travelers and they are highly interested in using WI-Fi access in trains and it has been realized. Several opportunities to provide broadband internet access on trains includes technology such as Wi-Fi, WiMax, satellite technologies and radio-over-fiber communication on broad trains are complicated because they face several difficulties like high penetration losses of signals which includes high vibration environment that require mechanical isolation of communication devices; thermally challenging environment where heat is the significant issues in train; electrical environment that is proximity to high voltages like electrical trains, high magnetic fields- in magnetic levitation. Other factors which affects train communication also includes limit visibility to wireless communications in tunnels; frequent handoffs in the cellular network which results in packet loss and packet reordering. Hence to enable high-quality broadband Internet services in high speed trains, many solutions have been proposed which are classified into four: Cellular network, radio-over-fiber (RoF), leaky-coaxial-cable and satellite communication based network access. Even though these are effective, still faces some difficulties and drawbacks.