Light transmission distance in the Congo region



Overview

Analysis of the lightning activity during 18 years in the Congo BasinThis study extends and completes previous studies based on 9 years of lightning activi.

Key Takeaways

Wireless optical communication systems in the Congo region can transmit light over distances of approximately 4. 8 kilometers with high reliability.

Real-

World Implementation

In the Congo region, the cities of Brazzaville (Republic of Congo) and Kinshasa (Democratic Republic of Congo) are separated by the Congo River, which is about 4. 8 kilometers wide. Traditional fiber-optic connections require routing around the river, resulting in distances exceeding 400 kilometers and significantly higher costs.

To overcome this, Google's Taara project implemented wireless optical communication (WOC) links that use narrow, invisible beams of light to transmit data directly through the air between the two cities.

Performance and Capacity

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The WO

C system successfully transmitted nearly 700 terabytes of data over 20 days at speeds of 20 Gbps, achieving 99. 9% availability. This demonstrates that light can be reliably transmitted over several kilometers in the Congo region, providing fiber-like speeds without the need for extensive cabling.

Factors Affecting Transmission

While WO

C is highly effective, its performance can be influenced by environmental conditions: Weather: Fog, haze, or heavy rain can reduce visibility and attenuate the light signal, potentially affecting reliability. Obstructions: Birds or other objects crossing the beam path can cause temporary interruptions. Alignment: Terminals must detect and lock onto each other precisely to maintain a stable connection.

Advantages

Using light beams for data transmission in the Congo region offers several benefits: Shorter effective distance: Direct line-of-sight transmission avoids long detours required by fiber cables. High-speed connectivity: Comparable to fiber-optic networks. Cost efficiency: Reduces infrastructure costs in challenging terrains like rivers or dense urban areas.

In summary, light transmission in the Congo region via WOC can reliably cover distances of around 4. 8 kilometers, bridging connectivity gaps between cities separated by natural obstacles, while maintaining high-speed, high-capacity data transfer.

Article Content

Analysis of the lightning activity during 18 years in the Congo Basin

This study extends and completes previous studies based on 9 years of lightning activity in a large region of the Congo Basin (Soula et al., 2016; Kigotsi et al., 2018), by doubling the data period and

Analysis of the lightning activity during 18 years in the Congo Basin

Thanks to the close distance of observation (~50 km), the luminosity within the cloud was recorded, and the events are analyzed in unprecedented detail.

Distribution of lightning

The base of the negative region in a cloud is normally at roughly the elevation where freezing occurs. The closer this region is to the ground, the more likely cloud-to-ground strikes are.

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Estimation of detection efficiency of the world wide lightning location ...

Space observations have shown that the highest concentrations of lightning on the Earth are mostly on the territory of the Democratic Republic of Congo (DR Congo).

Estimation of detection efficiency of the world wide lightning location ...

The goal of this paper is, by way of preliminary introductory study of lightning climatology in the Congo Basin, to estimate the detection efficiency of the World Wide Lightning Location

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A visible decline is seen in the moisture flux and lightning properties, like in June-July months in the case of the RCP 8.5 scenarios, indicating that regions closer to the coasts still depict an impact due

Lightning climatology in the Congo Basin

The detailed analysis of climatology of lightning activity proposed in this study aims to improve the knowledge of the frequency of storms in the region of Congo Basin, in terms of

Congo, Dem. Rep. Electricity Transmission Network

Data for medium and high voltage transmission lines in Congo, Dem. Rep.. The data were compiled for the AICD study led by the World Bank. A variety of sources were consulted,

Speed of light

For long distances and sensitive measurements, the finite speed of light has noticeable effects. Much starlight viewed on Earth is from the distant past,

Electric power transmission

Electric transmission networks are interconnected into regional, national, and even continent-wide networks to reduce the risk of such a failure by providing multiple redundant, alternative routes for

Frontiers | Light field analysis for modeling and transmission ...

Abstract When analyzing the transmission characteristics of LEDs for long-distance lighting and communication applications, the light field is commonly assumed to be fully incoherent.

Google Uses Beams of Light to Provide High-Speed Internet Across

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Google''s parent company, Alphabet, has used beams of light to carry high-speed internet across the Congo River, providing nearly 700 terabytes of data within 20 days with 99.9% availability.

High-speed internet via airborne beams of light

A novel way of delivering high-speed internet via beams of light through the air has successfully transmitted data across the Congo River. It means that citizens in Brazzaville and

Google sends broadband across the Congo River via

It''s an alternative to laying cables across the Congo, the world''s deepest river Alphabet, Google''s parent company, has sent broadband across

Transmission lines in kilometres, in terms of high

Download scientific diagram | Transmission lines in kilometres, in terms of high voltage values from publication: The electricity supply industry in the Democratic

The Hydrology of the Congo Basin | Springer Nature Link

The chapter provides a comprehensive review of the hydrology of the Congo River Basin (CRB), emphasizing its physical features, current data and models, hydrological processes,

DR Congo electricity infrastructure map shows country''s power potential

Two other small insets show in greater detail Kinshasa and the region to the north east and the area south of Lake Kivu. A further inset illustrates proposals for a 400kV transmission

Understanding Fiber Optics: The Key to Efficient Long-Distance Light ...

Discover how fiber optics transmits light over long distances, enabling high-speed communication, enhancing data transfer, and revolutionizing connectivity worldwide.

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