Magnetic-Flux-Compensated Voltage Divider

Spurious voltages generated by lightning and other transient phenomena would be suppressed.

John F. Kennedy Space Center, Florida

A magnetic-flux-compensated voltage-divider circuit has been proposed for use in measuring the true potential across a component that is exposed to large, rapidly varying electric currents like those produced by lightning strikes. An example of such a component is a lightning arrester, which is typically exposed to currents of the order of tens of kiloamperes, having rise times of the order of hundreds of nanoseconds. Traditional voltage-divider circuits are not designed for magnetic-flux-compensation: They contain uncompensated loops having areas large enough that the transient magnetic fluxes associated with large transient currents induce spurious voltages large enough to distort voltage-divider outputs significantly.

A drawing of the proposed circuit was not available at the time of receipt of information for this article. What is known from a summary textual description is that the proposed circuit would contain a total of four voltage dividers: There would be two mixed dividers in parallel with each other and with the component of interest (e.g., a lightning arrester), plus two mixed dividers in parallel with each other and in series with the component of interest in the same plane. The electrical and geometric configuration would provide compensation for induced voltages, including those attributable to asymmetry in the volumetric density of the lightning or other transient current, canceling out the spurious voltages and measuring the true voltage across the component.

This work was done by Carlos T. Mata of Dynacs, Inc., for **Kennedy Space Center**. *For further information, contact the Kennedy Innovative Partnerships Office at (321) 867-8130.*
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High-Performance Satellite/Terrestrial-Network Gateway

This apparatus affords flexibility in the choice of data rates.

Lyndon B. Johnson Space Center, Houston, Texas

A gateway has been developed to enable digital communication between (1) the high-rate receiving equipment at NASA's White Sands complex and (2) a standard terrestrial digital communication network at data rates up to 622 Mb/s. The design of this gateway can also be adapted for use in commercial Earth/satellite and digital communication networks, and in terrestrial digital communication networks that include wireless subnetworks.

"Gateway" as used here signifies an electronic circuit that serves as an interface between two electronic communication networks so that a computer (or other terminal) on one network can communicate with a terminal on the other network. The connection between this gateway and the high-rate receiving equipment is made via a synchronous serial data interface at the emitter-coupled-logic (ECL) level. The connection between this gateway and a standard asynchronous transfer mode (ATM) terrestrial communication network is made via a standard user network interface with a synchronous optical network (SONET) connector. The gateway contains circuitry that performs the conversion between the ECL and SONET interfaces. The data rate of the SONET interface can be either 155.52 or 622.08 Mb/s. The gateway derives its clock signal from a satellite modem in the high-rate receiving equipment and, hence, is agile in the sense that it adapts to the data rate of the serial interface.

Although the ECL interface is synchronous, it bears ATM cells (in effect, data packets for asynchronous transmission) according to Telecommunications Industry Association (TIA) Standard 787. This characteristic renders the gateway transparent to any protocols above ATM, including the Internet Protocol (IP), the User Datagram Protocol (UDP), and the Transmission Control Protocol (TCP). The gateway can perform Reed-Solomon encoding for forward error correction (FEC) during operation with a satellite source that is not equipped for FEC.

The primary advantage afforded by this gateway is that it enables a satellite/Earth network or the wireless subnetwork of a terrestrial network to operate at a data rate independent of that of the network components at either end of a data-communication link. Because terrestrial networks must subscribe to stratified, standard data rates, the data rates of the terminals of the networks often limit the performances of the wireless links. Often, the optimal data rate for a wireless link in a terrestrial network lies between the standard data rates supported by the remainder of the network. A gateway like this one would enable a wireless portion of a terrestrial network segment to operate at its optimal data rate, while preserving the standardization of data rates at the network terminals.

This work was done by David R. Beering of Infinite Global Infrastructures, LLC, for **Johnson Space Center**.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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