fier to produce an amplified voltage. The key error source is the non-ideal ratios of feedback and input capacitors caused by manufacturing tolerances, called "mismatches." The mismatches cause non-ideal closed-loop gain, leading to higher differential non-linearity. Traditional solutions to the mismatch errors are to use larger capacitor values (than dictated by thermal noise requirements) and/or complex calibration schemes, both of which increase the die size and power dissipation.

The key features of this innovation are (1) the elimination of the need for charge redistribution to achieve an accurate closed-loop gain of two, (2) a higher feedback factor in the amplifier stage giving a higher closed-loop bandwidth compared to the prior art, and (3) reduced requirement for calibration. The accuracy of the new amplifier is mainly limited by the sampling networks' parasitic capacitances, which should be minimized in relation to the sampling capacitors.

This work was done by Gerard Quilligan of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16187-1

Real-Time Distributed Embedded Oscillator Operating Frequency Monitoring

Lyndon B. Johnson Space Center, Houston, Texas

A document discusses the utilization of embedded clocks inside of operating network data links as an auxiliary clock source to satisfy local oscillator monitoring requirements. Modem network interfaces, typically serial network links, often contain embedded clocking information of very tight precision to recover data from the link. This embedded clocking data can be utilized by the receiving device to monitor the local oscillator for tolerance to required specifications, often important in high-integrity fault-tolerant applications.

A device can utilize a received embedded clock to determine if the local or the remote device is out of tolerance by using a single link. The local device can determine if it is failing, assuming a single fault model, with two or more active links. Network fabric components, containing many operational links, can potentially determine faulty remote or local devices in the presence of multiple faults.

Two methods of implementation are described. In one method, a recovered clock can be directly used to monitor the local clock as a direct replacement of an external local oscillator. This scheme is consistent with a general clock monitoring function whereby clock sources are clocking two counters and compared over a fixed interval of time. In another method, overflow/underflow conditions can be used to detect clock relationships for monitoring. These network interfaces often provide clock compensation circuitry to allow data to be transferred from the received (network) clock domain to the internal clock domain. This circuit could be modified to detect overflow/underflow conditions of the buffering required and report a fast or slow receive clock, respectively.

This work was done by Julie Pollock, Brett Oliver, and Christopher Brickner of Honeywell, Inc. for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809.

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act {42 U.S.C. 2457(f)}, to Honeywell, Inc. Inquiries concerning licenses for its commercial development should be addressed to:

Aerospace – Defense & Space
Honeywell
P.O. Box 52199
Phoenix, AZ 85072-2199
Phone No.: (602) 822-3000

Refer to MSC-24765-1, volume and number of this NASA Tech Briefs *issue, and the page number.*