



# ITU-R PERFORMANCE OBJECTIVES OVERVIEW

STARLINK AND ERROR PERFORMANCE

RADIO HEAD TECHNOLOGY SERIES

Presented By Dick Laine, P.E.

# Standards and Performance Models

- **1975-1986 Vigants' Model (Jan75 BSTJ "Space Diversity Engineering" Paper)**  
Provides multipath fade outage and space, frequency, and N+1 diversity improvement models. Vigants' multipath fade outage model is also in CCIR Rep. 338-6 with  $K \cdot Q$  and metric notation.  
  
Recommends main and diversity path clearances based upon geoclimatic factors.  
  
Provides climate/terrain (c-factor and  $K \cdot Q$ ) and annual average temperature (t) maps, and alternate geoclimatic computations using the terrain roughness (w and S) computed from the path profile.
- **1994-2010 ITU-R Rec. P.530-5/6, -7/8, -9/10/11/12/13 Multipath/Rain Outage Models**  
Replace the Vigants CCIR Rep. 338-6 multipath outage model and/or the Crane rain outage model in some ITU-R microwave systems. ITU-R Rec. P.530-13 (2009) is current.
- **1986-2009 CCIR (now ITU-R) Rec. F.557/F.634 (ITU-T G.821) Objectives**  
Define availability (>10 CSES outage) and bit error performance ( $BER > 10^{-3}$  SES or LOF/LOS outage and  $BER < 10^{-6}$  ES quality) terms and objectives at 64 kbit/s for terrestrial PDH FWS radio-relay systems based upon ITU-T Rec. G.821.  
Replaced by ITU-R Rec. F.1703/F.1668 for new links.
- **2007 ITU-R Rec. F.1668-1 Error Performance Objectives (EPO)**  
Define G.826 (equipments designed before Mar02) and G.828 (new links) block error performance objectives for access, short-haul, and long-haul radio-relay portions in National and International PDH and SDH/Sonet systems. supercedes ITU-R Rec. F.1397, and F.1491-2.
- **2005 ITU-R Rec. F.1703 Availability ("Uptime") Objectives (EPO)**  
Define G.827 availability objectives for access, short-haul, and long-haul radio-relay portions in National and International PDH and SDH/Sonet systems. Replaces ITU-R Rec. F.557, F.1492, and F.1493 for new links.

**Note: Use the Aviat Networks ITU template for ITU F.1668-1 and F.1703 calculations**

# Purpose

The purpose of this presentation is to provide transmission engineering procedures and installation guidelines that will better ensure that:

- Periods of unpredicted path unavailability - long-term traffic outage (“downtime”) - and, therefore, subscriber disconnect - will not occur and that during “uptime” periods:
- The user’s performance (short-term outage, quality) objectives will be met. Because of unavoidable geoclimatic variability’s, per-hop performance is an “objective”. Only in a larger networks where per-hop performances “average out” should an end-to-end long-term system performance “requirement” be specified.

FRANK & ERNEST • Bob Thaves



THANK YOU

