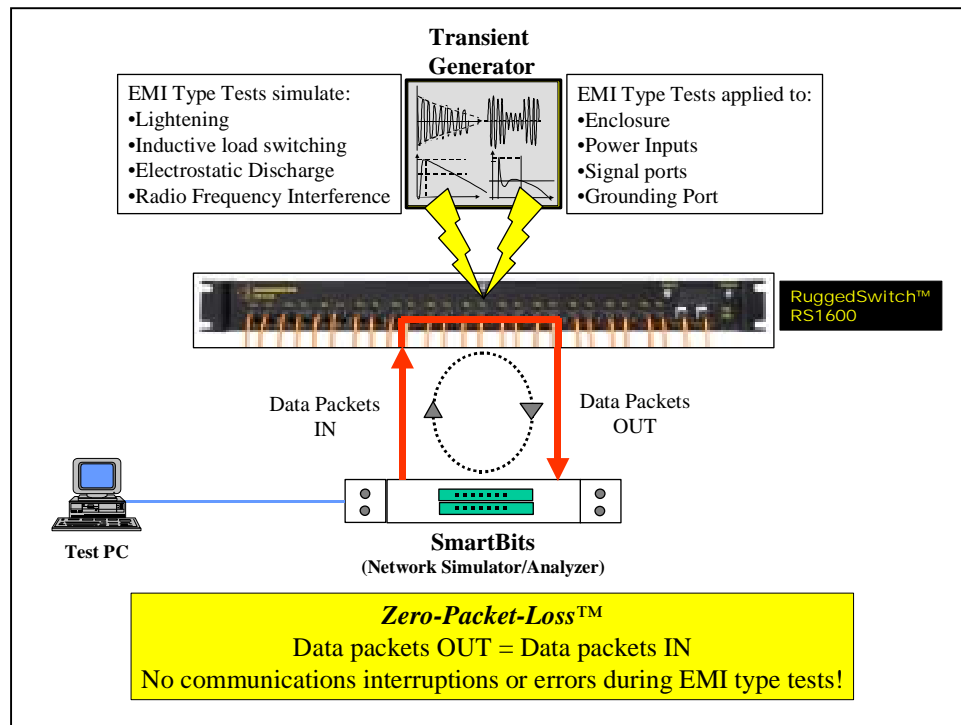


## RuggedSwitch™ offers “Zero-Packet-Loss™” Technology under EMI Stress

The RuggedSwitch™ Family of Fiber Optical Ethernet Switches provide error free operation under EMI stress levels as outlined in the new IEC 61850-3 standard for network equipment in substation environments.

**Concord, On, July 22<sup>nd</sup>, 2002** – The International Electrotechnical Commission (IEC) recently introduced a new standard, *IEC 61850-3: Communication networks and systems in substations*, to address the issues surrounding the reliable operation of network and communications equipment utilized for mission critical, real-time control and monitoring of the power system in a substation environment. The standard identifies the various types of EMI (electromagnetic interference) phenomena that will be encountered in the substation and categorizes them in terms of frequency of occurrence (i.e. continuous, high occurrence, low occurrence). It then defines a set of EMI Immunity type tests outlined in IEC 61000-6-5 which the equipment would have to pass in order to be compliant with the standard.








*“The type test levels for EMI immunity defined in IEC 61850-3 are by far the most severe and comprehensive I’ve seen to date”* said Marzio Pozzuoli, President and CEO of RuggedCom. *“They are as severe as the type tests required for protective relaying equipment and accordingly the same type of pass/fail criteria should be applied. In the protection and control world this means no ‘misoperation’ (i.e. proper operation) before, during and after the EMI type tests. If the communications network is to be an integral part of the protection and control system then it too must perform without ‘misoperation’ before, during and after the EMI type tests. To us at RuggedCom, having come from a protection and control background, this means that*


communications through our RuggedSwitch™ RS1600 occurs error free without interruption or delay! That's what we mean by Zero-Packet-Loss under EMI stress." Table 1 below summarizes the EMI type tests and levels applied

RuggedCom has spent considerable effort and resources to achieve Zero-Packet-Loss™ performance. "We've invested heavily in the necessary type test and lab equipment required to perform the full scope of EMI related type tests. This was crucial in our ability to succeed at achieving error free communications during the application of the respective type tests. We didn't just simply submit one unit to a test lab, we used our in-house lab and equipment to test multiple units from different production pilot runs to ensure repeatability."

There are eleven EMI related type tests that are applied (see Table 1.) during which communications packets are continuously routed through the RuggedSwitch™ RS1600 via an industry standard SmartBits 600 Network Simulator which also continuously monitors the data to ensure no errors, delays or packet loss occur.

Table 1: IEC 61000-6-5 EMI Test Levels vs. RuggedSwitch™						
Referenced Standards	IEC-61000-6-5 LEVELS					RuggedSwitch™ LEVELS (All Signal Port Types)
	Signal Port Types					
	Enclosure Ports	Signal Ports (In field)	a.c. Input Power Ports	d.c. Input Power Ports	Earth Port	
IEC-61000-4-2 ESD	3 (8kV Air, 6kV Contact)					 4 (15kV Air, 8kV Contact)
IEC-61000-4-3 Radiated RFI	3 (10 V/m)					 X (35 V/m) IEEE C37.90.2
IEC-61000-4-4 Fast Transients		4 (2kV/1kv)	4 (2kV/1kv)	4 (2kV/1kv)	4 (2kV/1kv)	4 (2kV/1kv)
IEC-61000-4-5 Surge		3 (2kV/1kv)	4 (4kV/2kv)	3 (2kV/1kv)		 4 (4kV/2kv)
IEC-61000-4-6 Induced RFI		3 (10 V)	3 (10 V)	3 (10 V)	3 (10 V)	3 10 V = 140db(uV)
IEC-61000-4-8 Magnetic Field	2 (3 A/m)					 4 (40A/m Continuous) 1000 A/m for 1s
IEC-61000-4-11 Voltage Dips a.c. Power			30% for 1 cycle			30% for 1 cycle
IEC-61000-4-12 Damped Oscillatory		2 (1kV/0.5 kv)	3 (2.5kV/1kv)	3 (2.5kV/1kv)		 3 (2.5kV/1kv)
IEC-61000-4-16 Mains Freq.		4 30V Cont. 300V for 1s		4 30V Cont. 300V for 1s		4 30V Cont. 300V for 1s
IEC-61000-4-17 a.c. Ripple				10%		10%
IEC-61000-4-29 Voltage Dips d.c. Power				30% & 60% for 100ms		30% & 60% for 100ms

For more details on the RuggedSwitch™ product family and "Zero-Packet-Loss™ Technology visit: [www.ruggedcom.com](http://www.ruggedcom.com)

 RuggedSwitch Exceeds 61850-3 (61000-6-5) test levels