

**Source:** Lucent Technologies  
**Title:** Simulation Results for HSDPA Variable Reference Channel  
**Agenda item:** 5.1  
**Document for:** Discussion

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## 1. Introduction

In the paper, we present the simulation results for HSDPA Variable Reference Channel. The simulation results are obtained based on the simulation assumptions defined in [1] or agreed by subsequent email discussions after RAN4#24.

## 2. Simulation Results

Simulations to test VRC performance are performed with a CQI observation interval of 3 slots. CQI delay, measured from the end of the observation interval to the beginning of downlink HS-DSCH sub-frame that uses the CQI report, is taken to be 8 slots. Non-ideal PCPICH SIR estimation is used for CQI metric computation. Thresholds used in computing the CQI report are designed to constrain PER within 10% under static AWGN conditions with non-ideal SIR estimation. For PER computation, CRC errors are not counted when the transport format corresponding to CQI=1 is used in response to a request of CQI=0.

Simulation results are presented in Figures 1-16 and summarized for the purpose of UE performance requirements in Tables 1 and 2 for Variable Reference Channel 1 and Variable Reference Channel 3. Note that these correspond to UE capabilities of Fixed Reference Channel 1 and Fixed Reference Channel 3, respectively. VRC-1 and VRC-3 differ only in the inter-TTI distance and number of HARQ processes, such that data is transmitted on the HS-PDSCH once every three TTI in the case of VRC-1, while data is transmitted every TTI in the case of VRC-3. As expected, we see from the simulation results that the throughput obtained with VRC-1 is around one-third the throughput obtained with VRC-3, and PER performance is almost identical.

## 3. Conclusions

The simulation results on throughput and PER for HSDPA Variable Reference Channel under AWGN, PA3, PB3 and VA30 are shown in this paper. These results should be incorporated into the TR 25.890 to form the basis for UE receiver performance requirements on HSDPA Variable Reference Channel.

## References

- [1] R4-021538, 3GPP TR 25.890 V1.2.0 (2002-11) High Speed Downlink Packet Access: UE Radio Transmission and Reception (FDD) (Release 5)

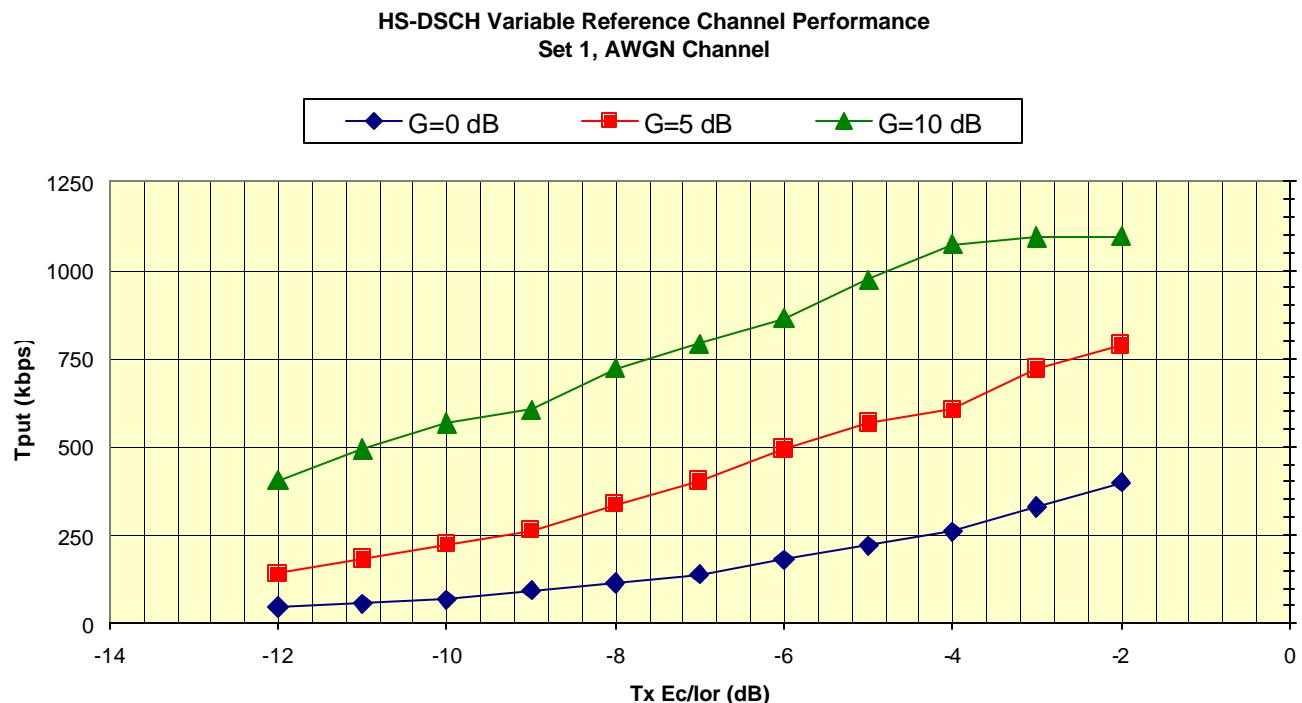
**Table 1 Summary of throughput and PER results for VRC-1 under AWGN, PA3, PB3 and VA30**

Propagation Channel	Ior/Ioc (dB)	HS-DSCH Ec/Ior (dB)	Throughput (kbps)	PER
AWGN	0	-3	329.44	0.0700
		-6	180.07	0.0972
	5	-3	719.80	0.0176
		-6	493.25	0.0198
	10	-3	1094.47	0.0838
		-6	863.14	0.0700
	0	-3	221.20	0.2926
		-6	129.64	0.2872
	5	-3	416.35	0.2770
		-6	278.04	0.2692
	10	-3	572.25	0.2876
		-6	437.03	0.2730
PB3	0	-3	206.90	0.1572
		-6	109.73	0.1754
	5	-3	356.85	0.0810
		-6	200.01	0.1026
	10	-3	447.05	0.0788
		-6	258.72	0.1000
	0	-3	122.41	0.3870
		-6	63.68	0.3914
	5	-3	219.95	0.3358
		-6	123.00	0.3434
	10	-3	297.19	0.3008
		-6	167.30	0.3190

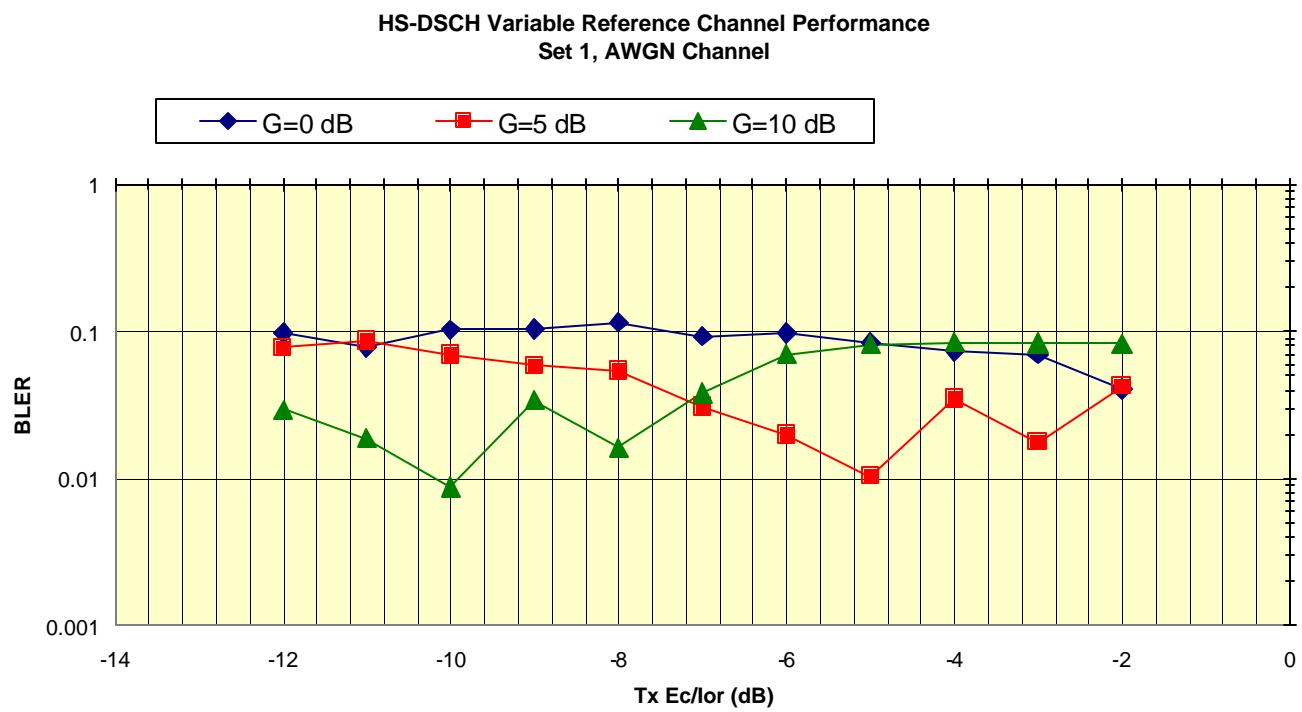
**Table 2 Summary of throughput and PER results for VRC-3 under AWGN, PA3, PB3 and VA30**

Propagation Channel	Ior/Ioc (dB)	HS-DSCH Ec/Ior (dB)	Throughput (kbps)	PER
AWGN	0	-3	986.57	0.0717
		-6	537.50	0.1014
	5	-3	2160.57	0.0174
		-6	1480.85	0.0203
	10	-3	3273.64	0.0865
		-6	2580.64	0.0733
	0	-3	665.51	0.2924
		-6	391.11	0.2833
	5	-3	1246.75	0.2800
		-6	826.24	0.2745
	10	-3	1729.30	0.2833
		-6	1299.81	0.2765
PB3	0	-3	623.13	0.1547
		-6	332.44	0.1689
	5	-3	1063.11	0.0861
		-6	601.94	0.1019
	10	-3	1346.23	0.0748
		-6	774.65	0.0995

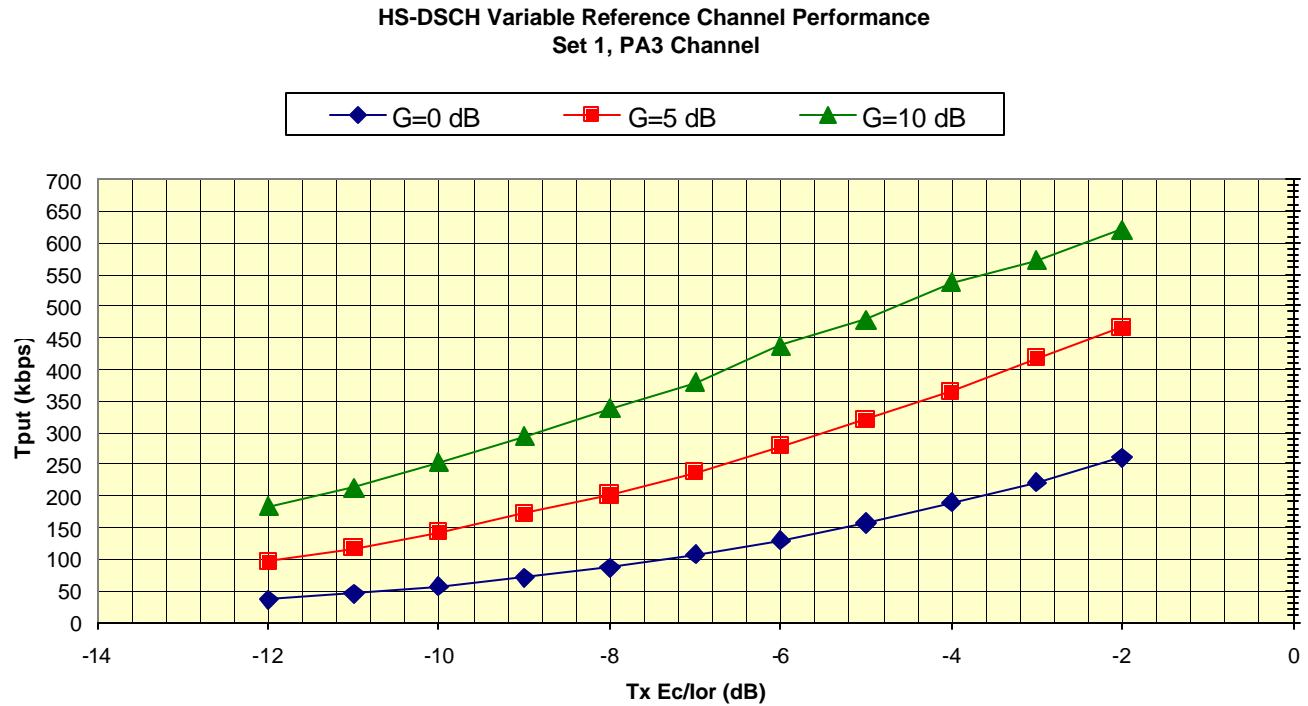
VA30	0	-3	369.97	0.3821
		-6	193.01	0.3886
	5	-3	671.66	0.3274
		-6	371.65	0.3381
	10	-3	898.56	0.2972
		-6	501.36	0.3219



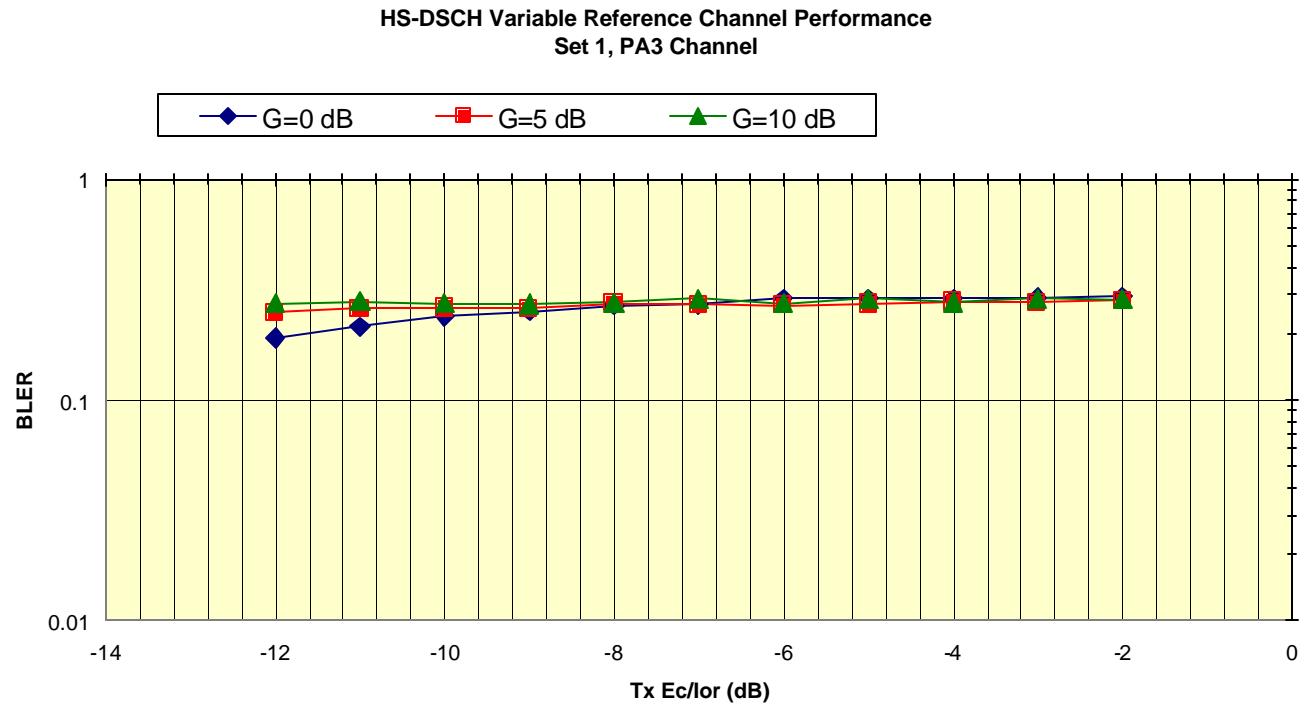
**Figure 1 Throughput with VRC-1 under AWGN**



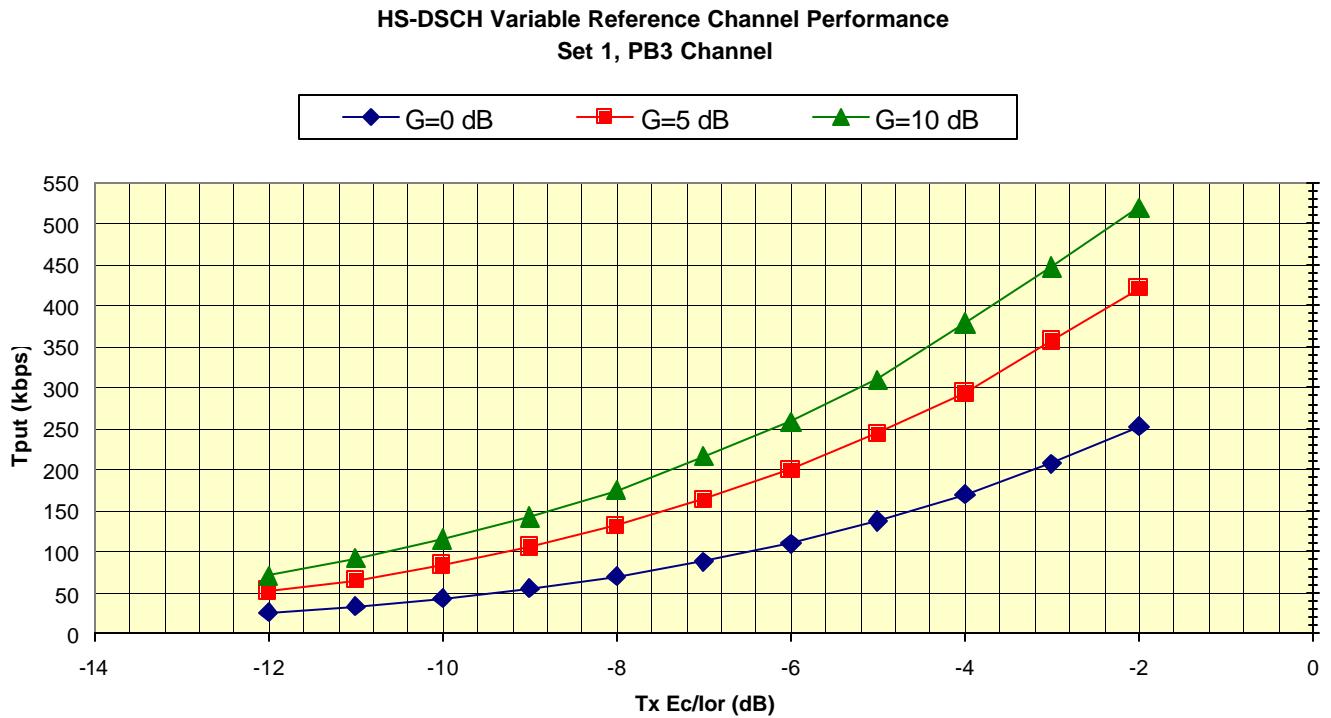
**Figure 2 PER with VRC-1 under AWGN**



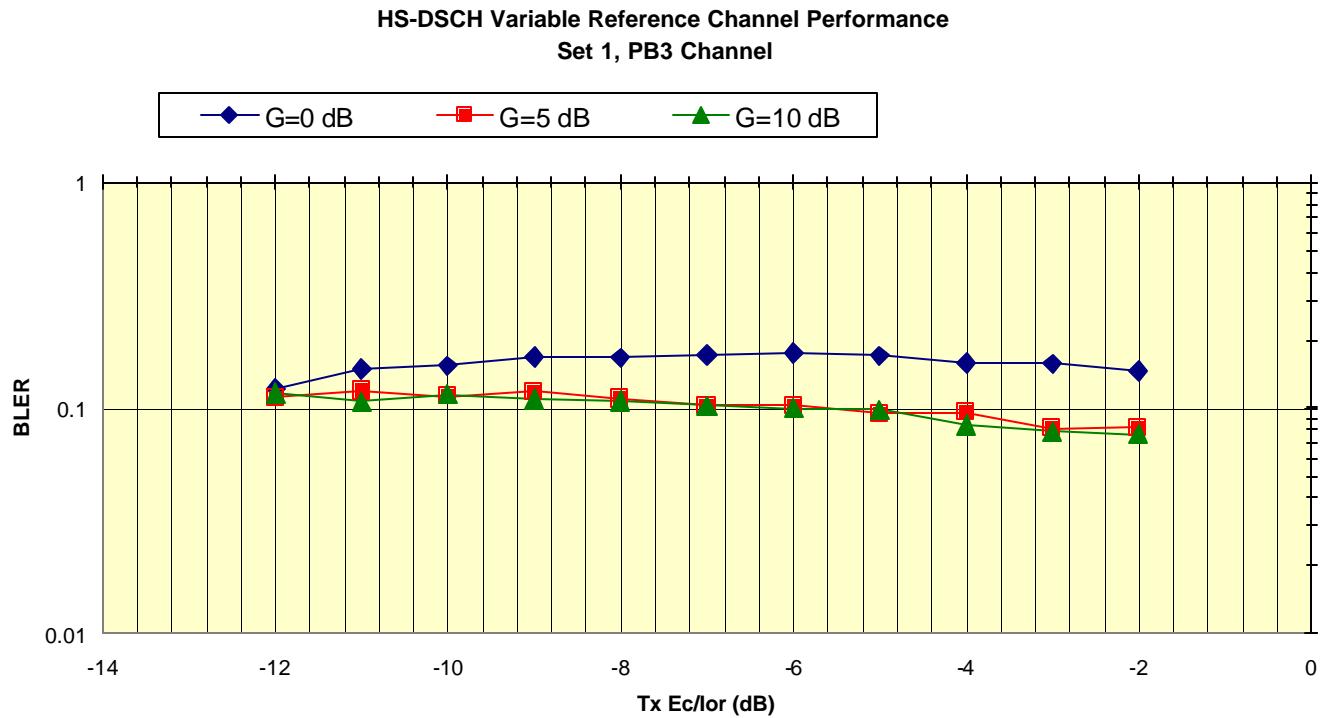
**Figure 3 Throughput with VRC-1 under PA3**



**Figure 4 PER with VRC-1 under PA3**



**Figure 5 Throughput with VRC-1 under PB3**



**Figure 6 PER with VRC-1 under PB3**

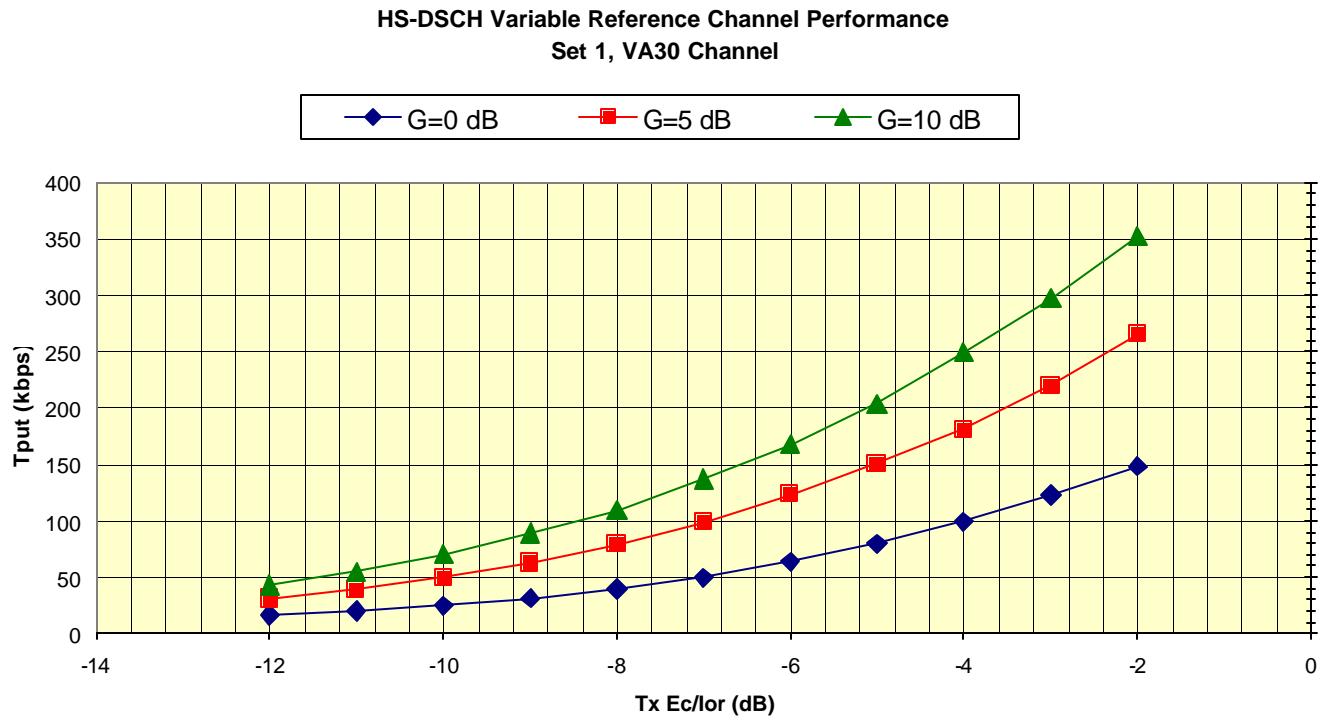


Figure 7 Throughput with VRC-1 under VA30

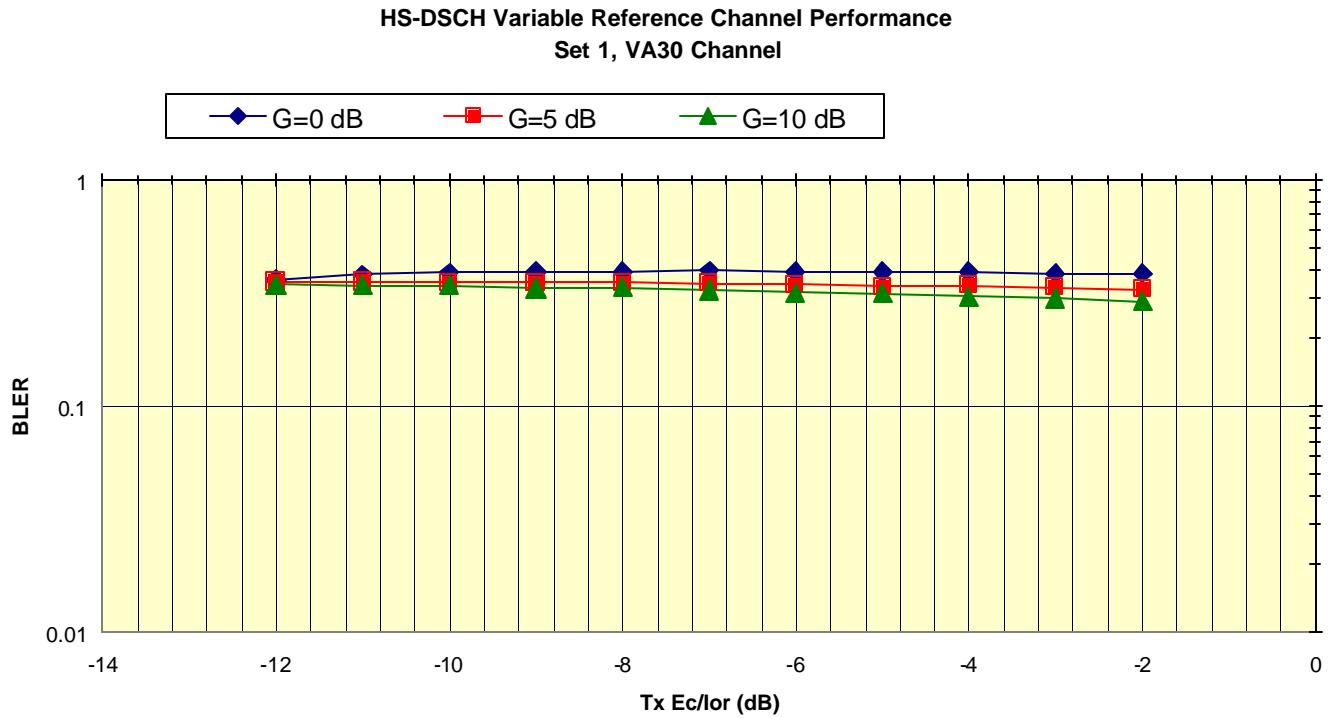
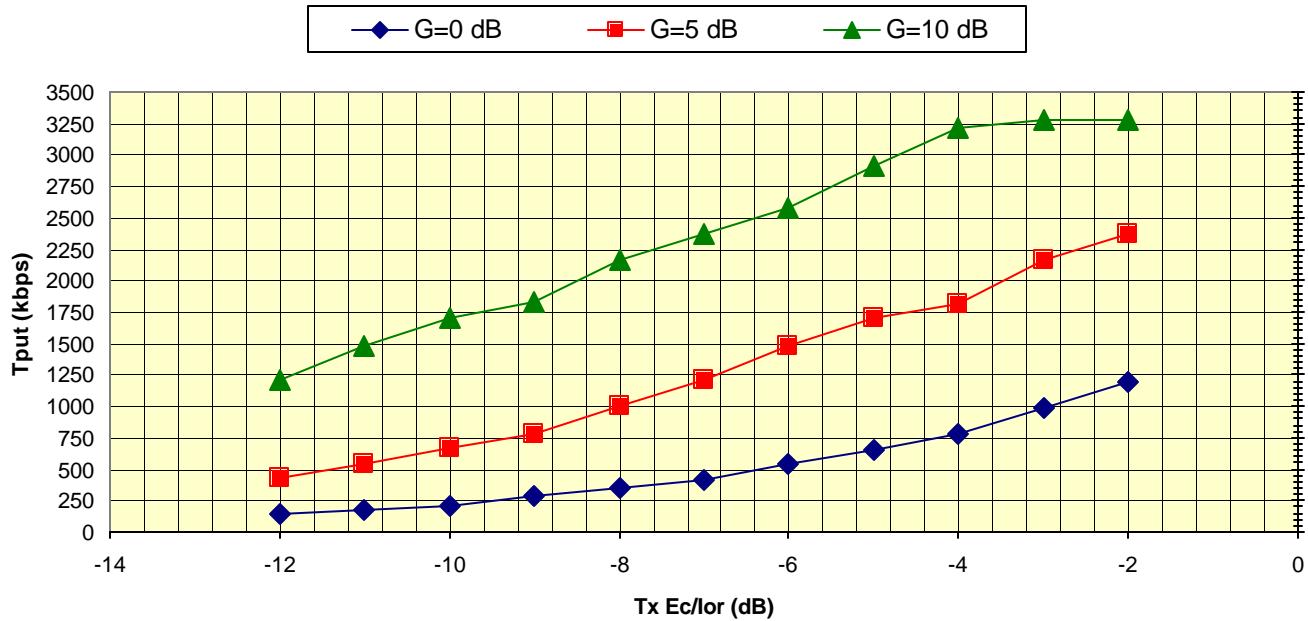


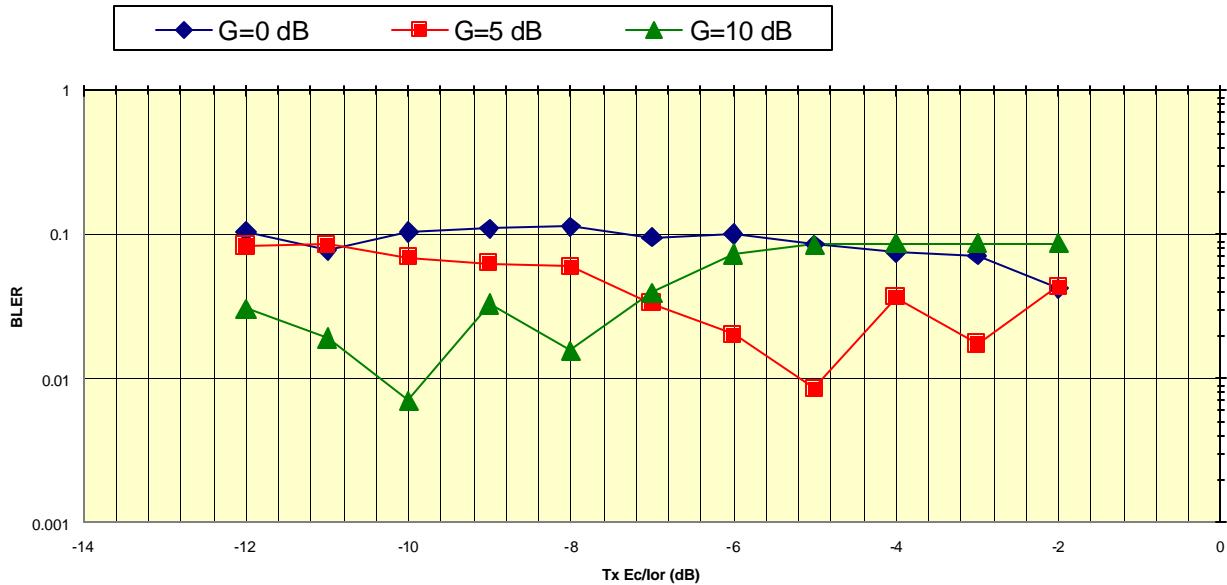
Figure 8 PER with VRC-1 under VA30

**HS-DSCH Variable Reference Channel Performance  
Set 3, AWGN Channel**



**Figure 9 Throughput with VRC-3 under AWGN**

**HS-DSCH Variable Reference Channel Performance  
Set 3, AWGN Channel**



**Figure 10 PER with VRC-3 under AWGN**

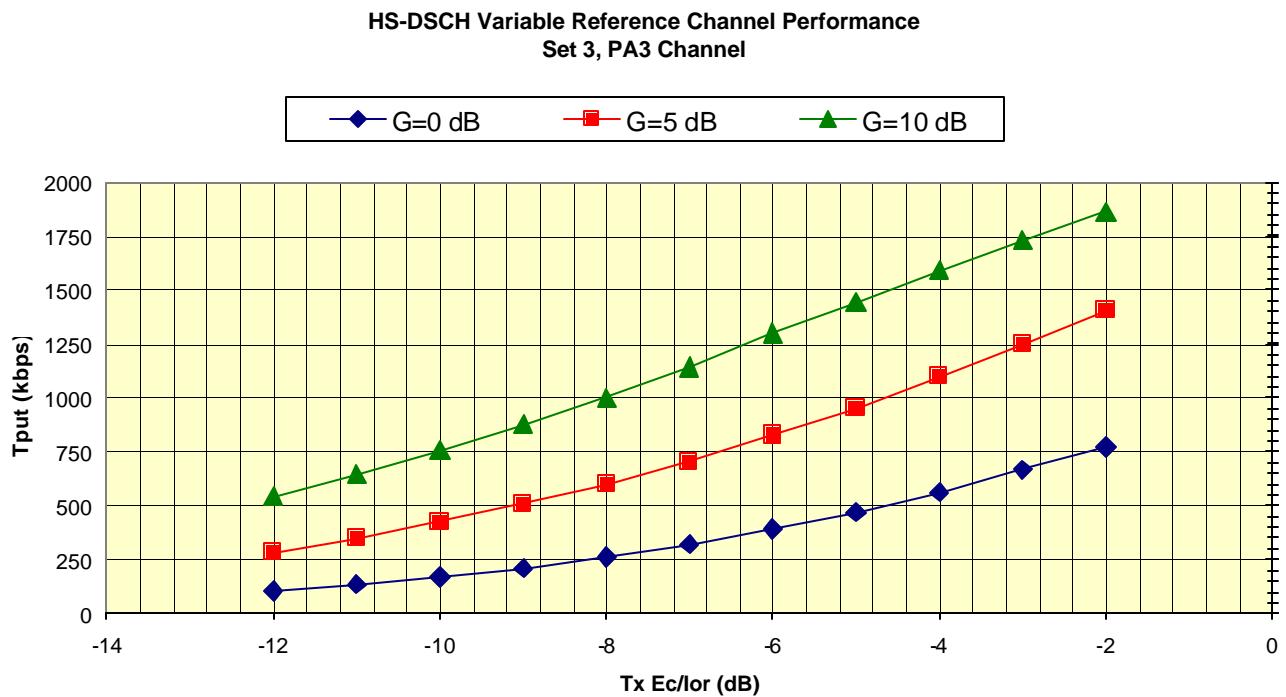


Figure 11 Throughput with VRC-3 under PA3

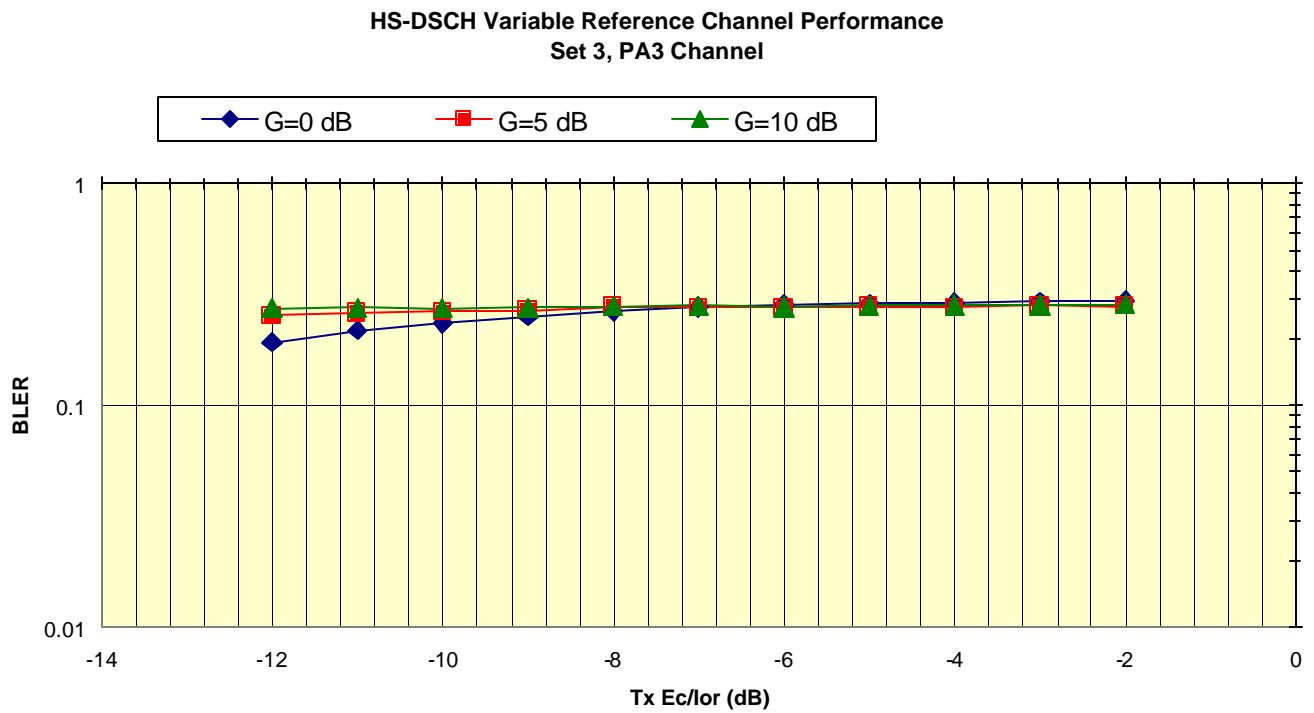


Figure 12 PER with VRC-3 under PA3

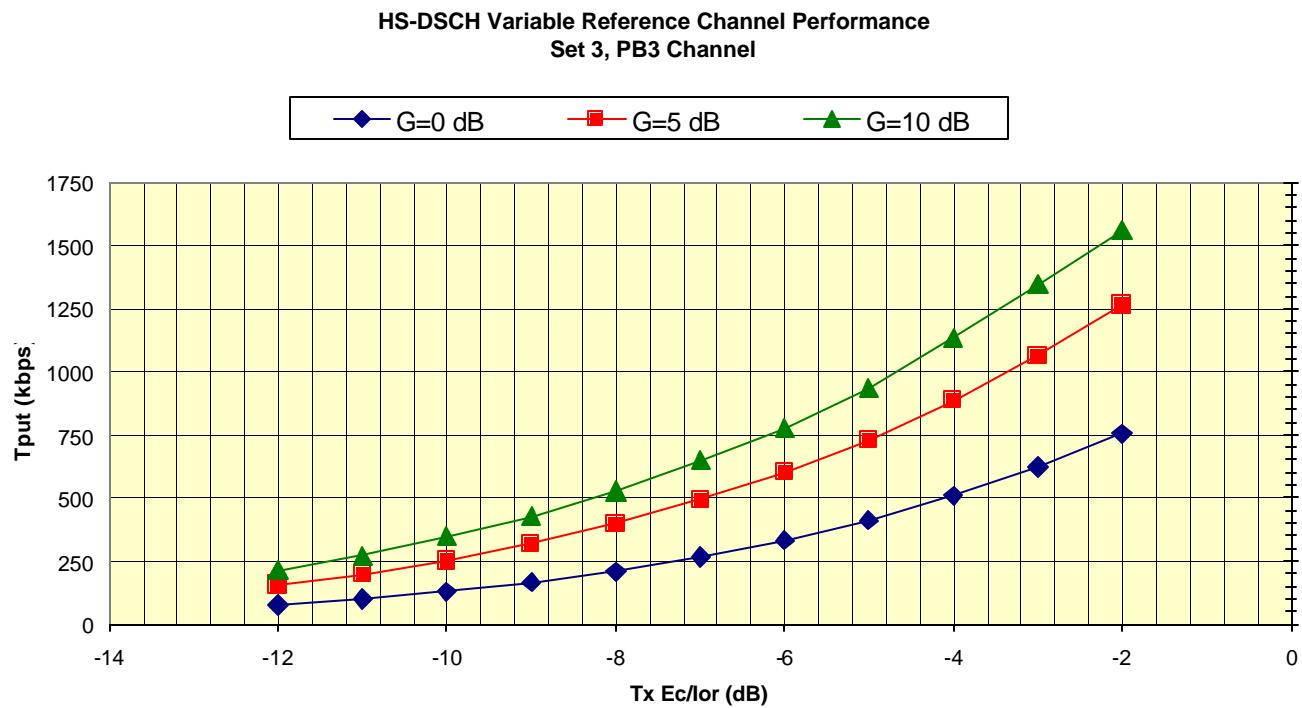


Figure 13 Throughput with VRC-3 under PB3

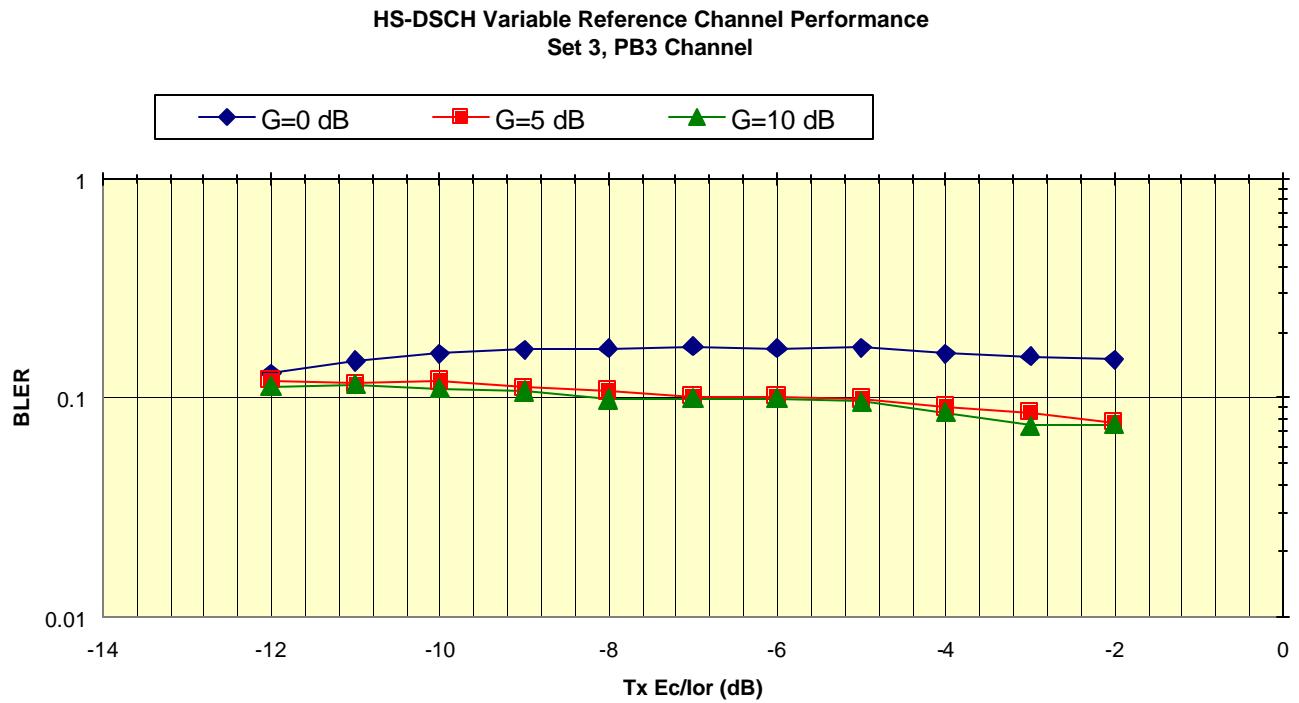


Figure 14 PER with VRC-3 under PB3

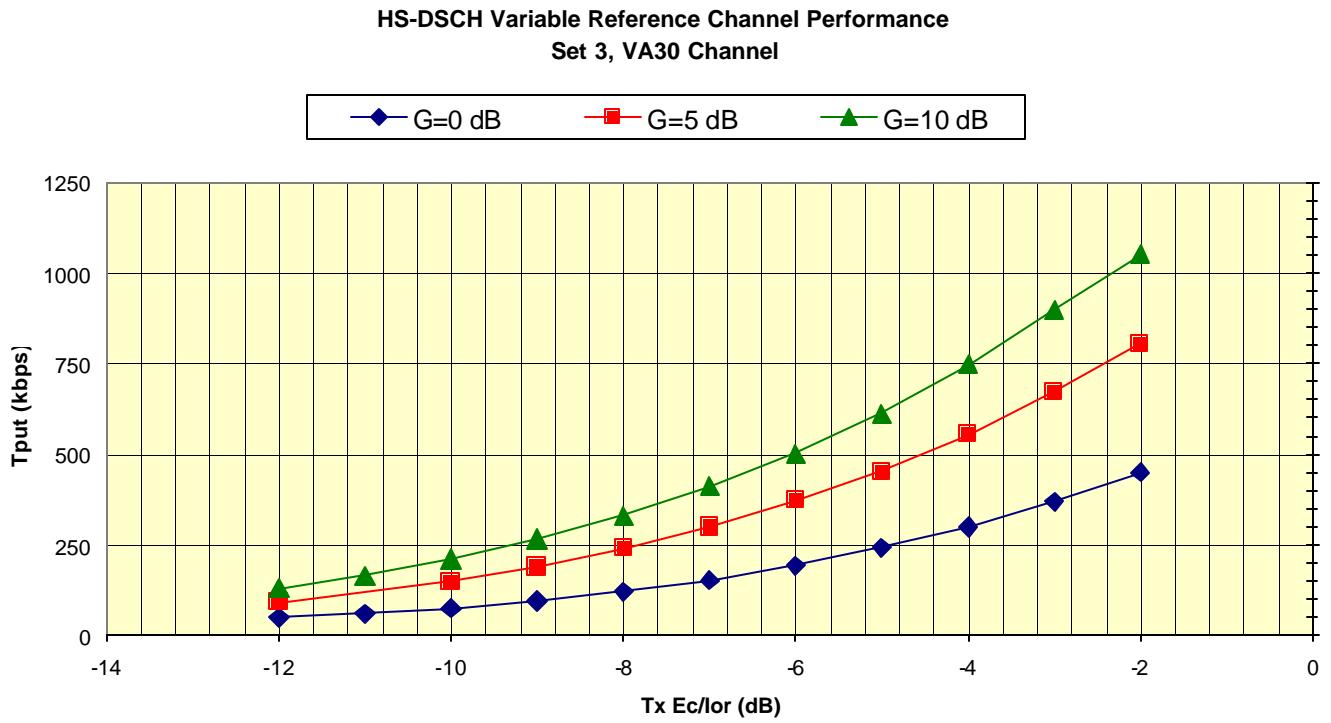


Figure 15 Throughput with VRC-3 under VA30

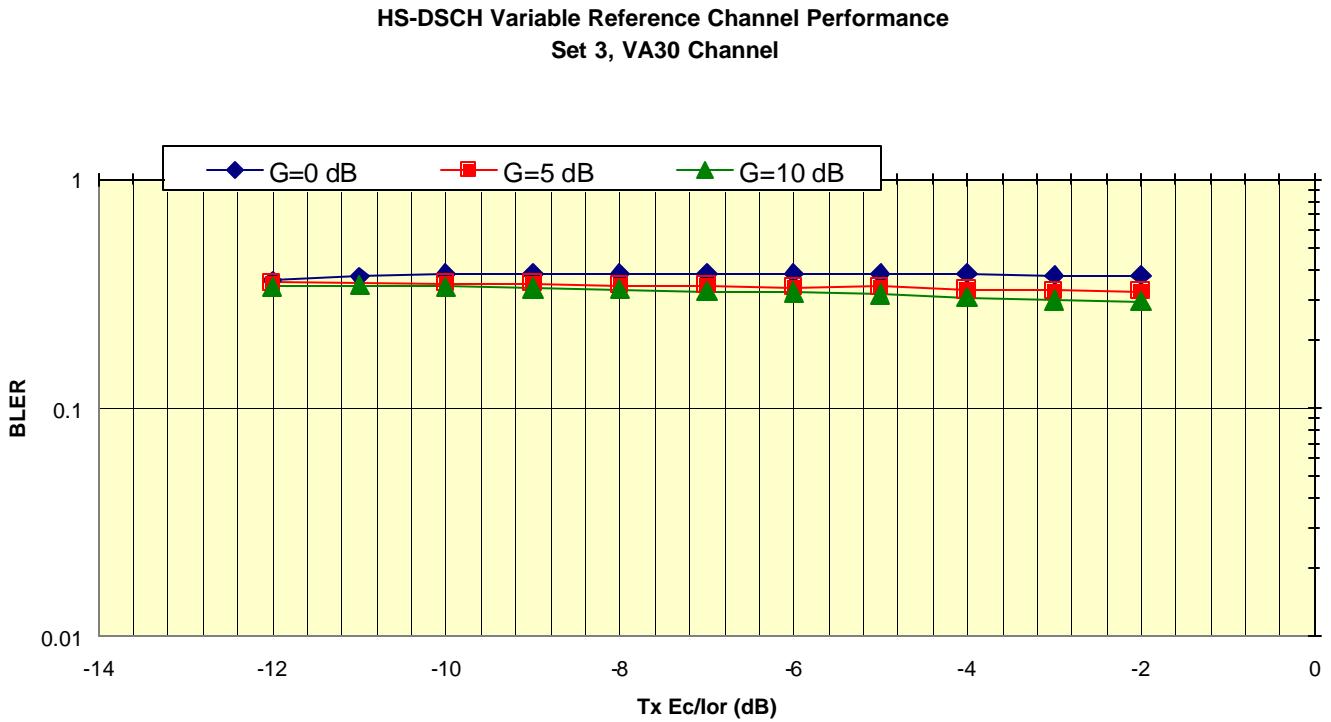


Figure 16 PER with VRC-3 under VA30