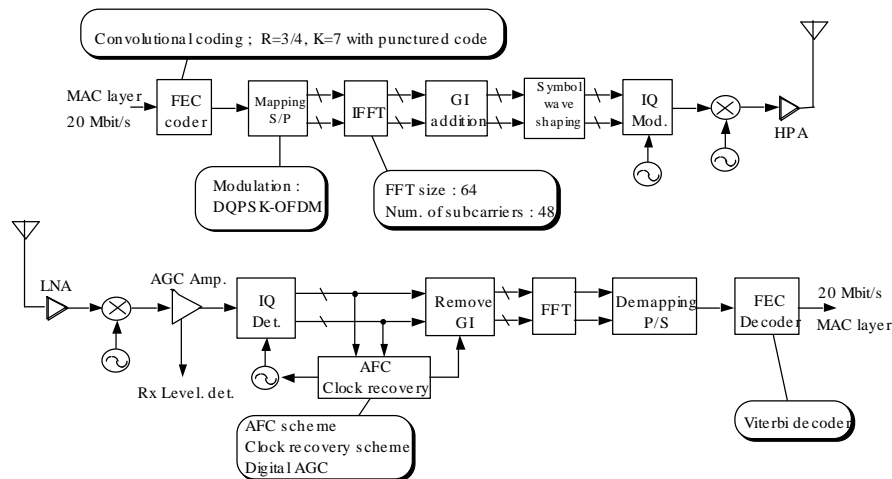


Performance of DQPSK-OFDM in Multipath Rayleigh Fading Channels

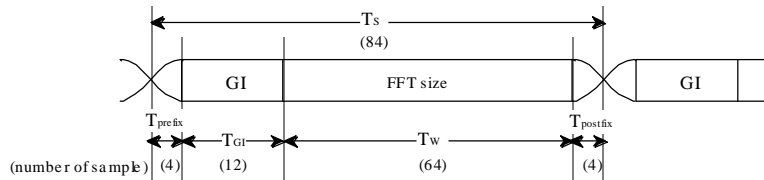
IEEE 802.11 Interim Meeting (Seattle)
Jan. 1998
NTT Wireless Systems Laboratories
Hitoshi Takanashi

Configuration of DQPSK-OFDM System

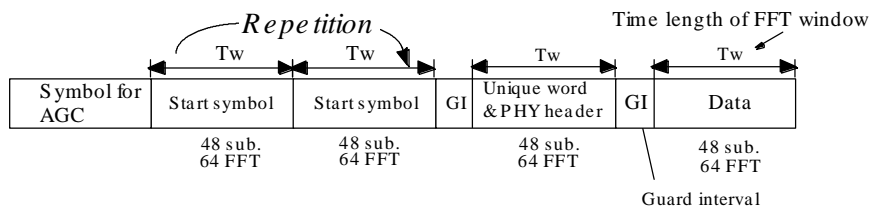


Major Parameters

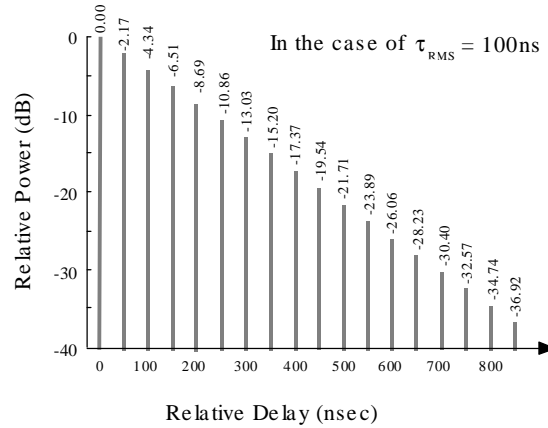
Raw data rate	20Mbit/s
Modulation	DQPSK-OFDM
Coding rate	3/4
FFT size	64
Number of sub-carriers	48 (FFT over sampling ratio: 1.33)
Guard interval (GI)	12 samples (5 times of RMS delay spread (100ns))
Number of T _{pre fix} samples	4 samples (correspond α=0.1)
Symbol duration (T _S)	84 samples (=3.6μs)
Baseband clock rate	23.33 MHz
OFDM Bandwidth	17.5 MHz



Frame Format

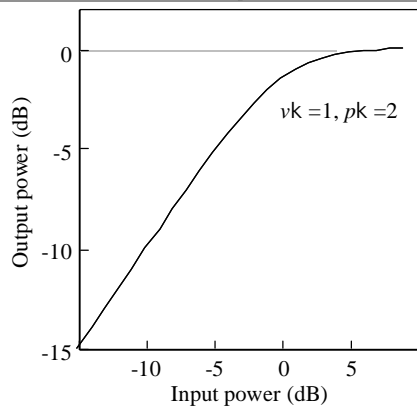


Multipath Channel Model



Multipath delay profile (18 path Rayleigh model)

Characteristics of solid state power amplifier



$$g[A] = \frac{v_k A}{\left(1 + \left(\frac{v_k A}{A_0}\right)^{2pk}\right)^{\frac{1}{2pk}}}$$

$$F[A] = 0$$

$g[A]$: Input and output amplitude function

$F[A]$: Input and output phase function

v_k : Small-signal gain

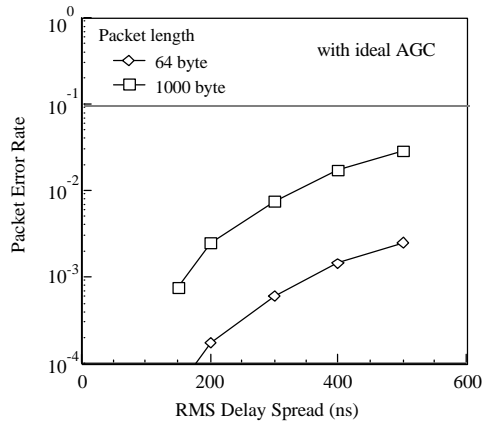
pk : Parameter of smoothness

A_0 : Output amplitude at saturation point

Reference: E. Bogenfeld, et al., "Influence of Nonlinear HPA on Trellis-Coded OFDM for Terrestrial Broadcasting of Digital HDTV", *GLOBECOM '93*, pp. 1433-1438, 1993.

Packet Error Rate in Multipath Propagation

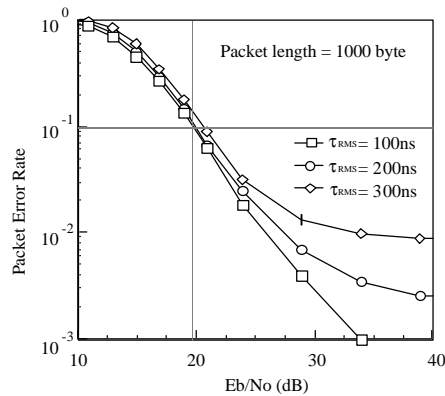
channel : OBO= 5dB)



Packet Error Rate versus RMS Delay Spread

Packet Error Rate in Multipath Propagation with AWGN

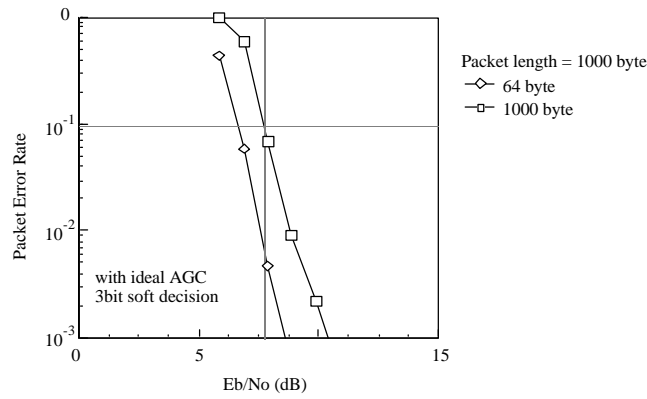
channel : OBO= 5dB)



Packet Error Rate versus Eb/No

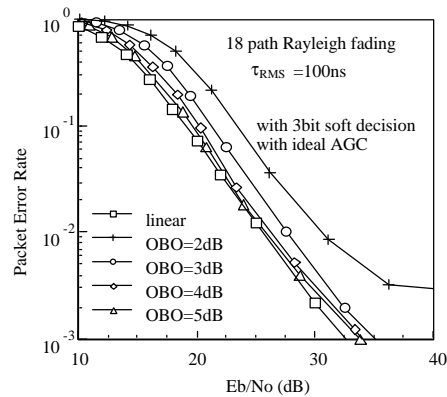
Packet Error Rate with AWGN

channel : OBO= 5dB)



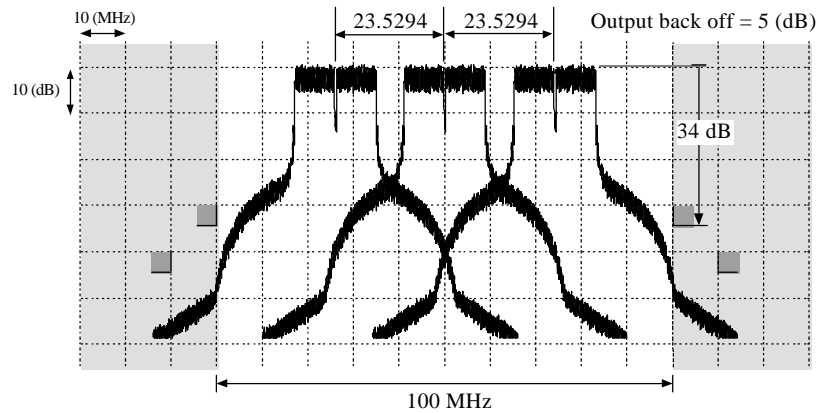
Packet Error Rate versus Eb/No

Packet Error Rate in Multipath Propagation with AWGN



Packet Error Rate versus Eb/No

Spectrum Allocation



Conclusions

- Delay spread of 400 ns and more is tolerable by employing DQPSK-OFDM
- OBO of 4 or 5 dB is enough
- Spectrum allocation of HIPERLAN can be adopted
- Required E_b/N_0 is 20 dB in a Rayleigh Fading channel
 - Propagation loss up to 92 dB in a Rayleigh Fading channel