Proposal for an improved long training symbol phase

Masahiro Morikura and Masato Mizoguchi

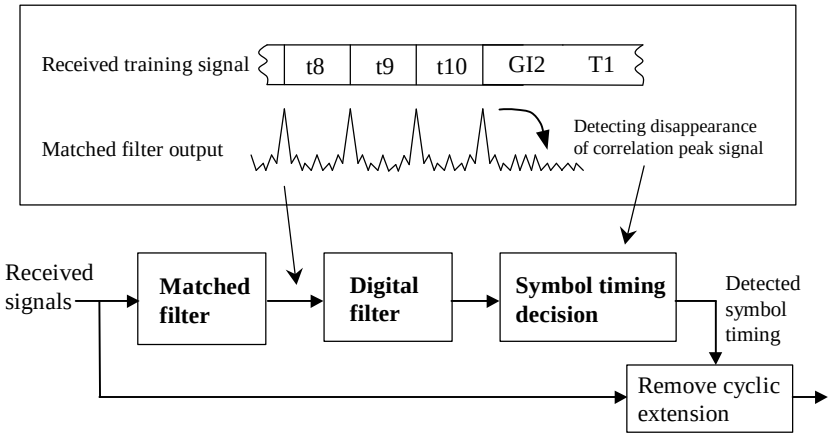
NTT
morikura@ansl.ntt.co.jp
Phone:+81-468-59-3132
fax:+81-468-55-1172

A comment on the long training symbol phase

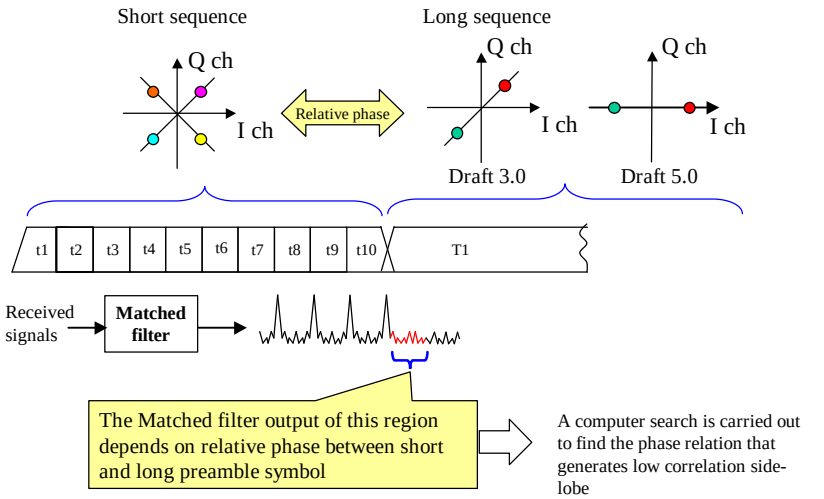
Clause number; 17.3.3 PLCP preamble (SYNC)

Comment;
The phase relation between short preamble (t1-t10) and long preamble (T1,T2) in draft 5.0 causes degradation in timing detection accuracy. This is because the matched filter output for detecting the short preamble pattern has large side-lobe in boundary region between t10 and T1 when the phase relation in D5.0 is used. This large side-lobe badly affects the timing decision value when multi-path delayed signals are superimposed.

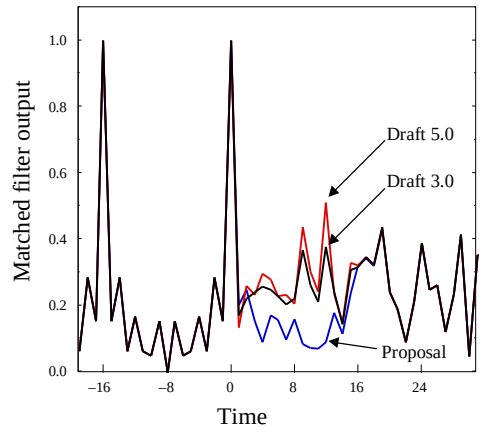
A symbol timing detection scheme

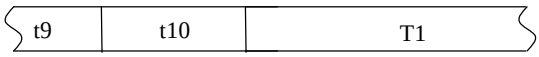


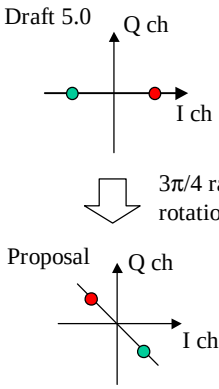
An effect of the long training symbol phase



Searched results of Matched filter output

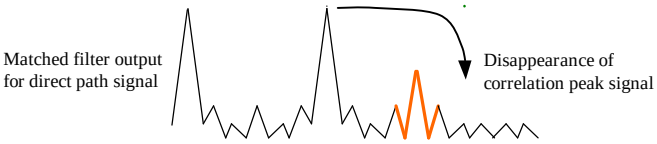




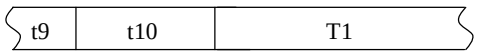


The low sidelobe is obtained by the proposed long preamble phase

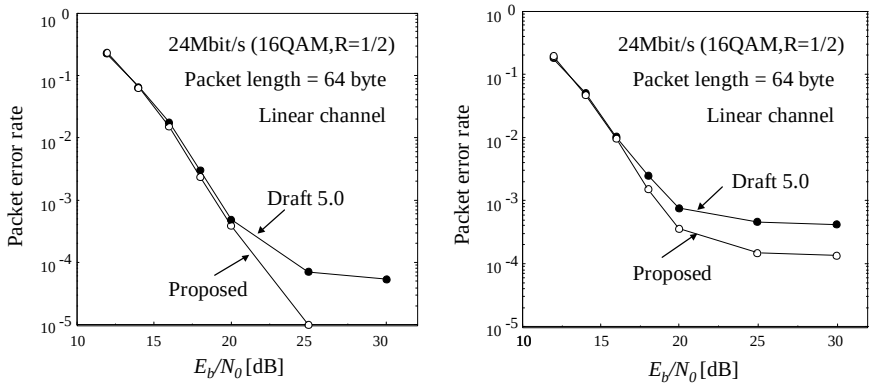
Influence of the high correlation side-lobe on timing detection accuracy



Large correlation side-lobe degrades symbol timing detection accuracy



PER performance in multipath propagation with AWGN



(a) Delay spread = 100ns (b) Delay spread = 150ns

Packet error rate versus E_b/N_0

Conclusions

- A search was carried out to find the long preamble phase that gives low correlation side-lobe.
- Recommendation :

  Change Eq.(8) so as to rotate the all signal phase +(3/4)π

  $L_{-26,26}$={-1+j, -1+j, +1-j, +1-j, -1+j, -1+j, +1-j, -1+j, …

  , ... , -1+j, -1+j}/sqrt (2.0)

- By only changing the preamble phase, the irreducible packet error is improved to less than 1/3 that of Draft 5.0