

Bug Fix: Correct RxFFE taps when Quantization Clip Method = Fast

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Summary

- ❑ The RxFFE taps are a function of noise. If Clip Method = Fast, the RxFFE taps are based upon the fast noise calculation
- ❑ After EQ optimization, the final Quantization Noise is always calculated using the Slow Method. This means there is some error associated with the RxFFE taps found during EQ optimization
- ❑ Bug Fix: If Clip Method = Fast, set Clip Method = Slow after Eq optimization finishes and find RxFFE taps again
- ❑ This forces the required alignment: If Fast and Slow achieve the same optimal EQ, then all the output results will be identical

Code Change

- ❑ The need to find RxFFE after running EQ optimization presented an architectural gap in the current COM code. To resolve this, a new function called “optimize_fom_BestEQ” was introduced. This is a general purpose function that acts as a wrapper around “optimize_fom”. It re-runs EQ optimization but only uses the Best EQ found in the previous full sweep.

```
% Check parameter settings that trigger a re-run of optimize_fom with Best EQ
Run_single_optimize = 0;

% Clip Method = "Fast"
set_clip_method_slow = false;
if OP.RxFFE && strcmp(OP.FFE_OPT_METHOD, 'MMSE') && param.N_qb ~= 0 && strcmpi(param.clip_method, 'fast')
    Run_single_optimize = 1;
    set_clip_method_slow = true;
end

fom_result = optimize_fom(OP,param, chdata, sigma_bn,do_C2M);
if fom_result.eq_failed ; return; end % RIM 12-20-2023

% If clip method for used for quantization noise is "Fast", set it to "Slow" for final calculation
% This only applies when using RxFFE with MMSE and Quantization Noise
if set_clip_method_slow
    param.clip_method = 'Slow';
end

% Re-run optimize_fom with Best EQ if any condition has triggered it
if Run_single_optimize
    fom_result = optimize_fom_BestEQ(fom_result, OP, param, chdata, sigma_bn, do_C2M);
end
```

Results

- ❑ For many cases, the optimal EQ found with Clip Method “Slow” vs “Fast” is identical. With the bug fix in place, those cases will now give the exact same COM output
- ❑ For some cases, the difference in Clip Method results in a different optimal EQ. Those cases still have a different COM output, but now the difference has been decreased because of the proper calculation of quantization noise and RxFFE taps using Slow method in the end.

Thank You!