预均衡器 pre-equalization

预均衡系数-线性滤波器的抽头系数

群时延

微反射

幅频特性-幅度与频率的响应曲线图

傅里叶变换

信号分析

[信号分析](http://baike.baidu.com/item/%E4%BF%A1%E5%8F%B7%E5%88%86%E6%9E%90" \t "_blank)和其他领域使用复数可以方便的表示周期信号。模值|*z*|表示信号的幅度，[辐角](http://baike.baidu.com/item/%E8%BE%90%E8%A7%92" \t "_blank)arg(*z*）表示给定频率的[正弦波](http://baike.baidu.com/item/%E6%AD%A3%E5%BC%A6%E6%B3%A2" \t "_blank)的[相位](http://baike.baidu.com/item/%E7%9B%B8%E4%BD%8D" \t "_blank)。

利用[傅立叶变换](http://baike.baidu.com/item/%E5%82%85%E7%AB%8B%E5%8F%B6%E5%8F%98%E6%8D%A2" \t "_blank)可将实信号表示成一系列周期函数的和。这些[周期函数](http://baike.baidu.com/item/%E5%91%A8%E6%9C%9F%E5%87%BD%E6%95%B0" \t "_blank)通常用形式如下的复函数的实部表示：

其中ω对应[角频率](http://baike.baidu.com/item/%E8%A7%92%E9%A2%91%E7%8E%87" \t "_blank)，复数*z*[包含](http://baike.baidu.com/item/%E5%8C%85%E5%90%AB" \t "_blank)了幅度和相位的信息。

电路分析中，引入电容、电感与频率有关的虚部可以方便的将电压、电流的关系用简单的[线性](http://baike.baidu.com/item/%E7%BA%BF%E6%80%A7" \t "_blank)方程表示并求解。（有时用字母*j*作为虚数单位，以免与电流符号*i*混淆。）

傅里叶变换在物理学、电子类学科、[数论](http://baike.baidu.com/item/%E6%95%B0%E8%AE%BA" \t "_blank)、组合数学、信号处理、概率论、统计学、密码学、声学、光学、海洋学、结构动力学等领域都有着广泛的应用（例如在信号处理中，傅里叶变换的典型用途是将信号分解成频率谱——显示与频率对应的幅值大小）。

带内频响的幅度曲线-是通过预均衡系数通过傅里叶变换求得的幅频特性

带内频响 in channel frequency response（ICFR）

ICFR描述了6MHz 数据信道内的平坦度，当信道不平坦，数据信号发生畸变同时接收设备对接收到的数据处理有困难的时候

ICFR stands for In-Channel Frequency Response. ICFR describes the flatness of your 6 MHz digital channel. When the channel is not flat, the digital signal may become distorted and receiving equipment can have a difficult time making decisions about the bits being received. ICFR is measured in dB(deciBels), with 0dB being the reference or a perfectly flat channel, and the ICFR measurement being a ratio of power variance within the 6MHz channel end to end. ICFR should ideally be under 3dB for proper Forward Error Correction(FEC) to take place although MSOs(Multiple Service Operators) may have tighter standards. Comcast, for instance, typically shoots for 2dB ICFR. MOST ICFR issues will be premise issues as the plant is usually rigorously maintained with the premise being a wildly uncontrolled variable. Poorly installed F-connectors, bad splitters, cable with improper bend radii, the presence of multiple F-81 (barrel) in-line couplers within 50 feet of one another, etc. add to your ICFR; Think anything that causes micro-reflection. This number mostly describes the quality of an installer's workmanship. Fittings that are "almost right" can tack on .10dB to your ICFR for each one. A "perfect" fitting will increment your ICFR by nearly 0dB. ICFR issues in the plant affecting several modems will trigger a plant fault event for plant maintenence. 98% of the time, high ICFR occurs after the tap. Your drop fittings and ground block can have the greatest impact on this number at the premise. The higher the ICFR, the harder a time a CM will have maintaining its USMER (UpStream Modulation Error Ratio) through Adaptive Equalization and the higher a chance of Bit Errors occuring. Indeed, minimizing ICFR maximizes performance.

相位预均衡 phase pre-equalizeation

PNMP-PNM using pre-equalization

F8主抽头 传输主信号

F1-F7 前抽头 群时延补偿

F9-F24后抽头 微反射补偿

MTE-Main Tap Energy 主抽头能量

Pre MTE-Pre – Main Tap Energy前抽头能量

Post MTE – Post Main Tap Energy 后抽头能量

TTE – Total Tap Energy 总抽头能量

MTC – Main Tap Compression主抽头压缩 MTC 大于2dB预均衡器达到极限无法成功补偿失真，均衡失效，线路故障十分严重

NMTER- Non Main Tap to Total Energy Ratio 非主抽头与总能量比 线路补偿要消耗的能量比，反应失真的严重性

PreMTTER -Pre Main Tap to Total Energy Ratio

PostMTTER – Post Main Tap to Total Energy Ratio

PPESR – Pre –Post Energy Symmetry Ratio

前后抽头之间的能量特性，反应不同的故障类型

TDR -Time Domain Reflectometry

故障位置信息，通过预均衡系数的幅度分布，可以找出微反射传输的时间差，由时间差和信号传输速度可以计算出故障距离

MRLevel Micro reflection level

反应故障级别

故障定位方法

通过检测CC下的CM的预均衡系数，并计算出MRLevel、TDR，并分析每个CM的带内频响曲线，再结合拓扑，进行故障分组，可以准确定位故障位置

**Adaptive Equalizer Coefficients**

自适应预均衡器

taps orders and coefficients

抽头的阶数和系数

**6.8 Use Case Examples for Adaptive Equalizer Coefficients**

The following four listed states describe the condition of the plant and the performance of the measurement devices for different scenarios operators may encounter in the field.

State 1. Adaptive equalizer tool is working properly and plant is within acceptable limits.

State 2. Adaptive equalizer tool is working properly, and plant exhibits severe linear distortion.

预均衡工具正常，单设备表现出严重的线性失真

Plant is stable 设备稳定

Plant is unstable (intermittent or trending) 设备不稳定（间歇或趋势）

State 3. Adaptive equalizer tool is working properly, but CMTS/CM is reacting badly

预均衡工具工作正常，但是CMTS和CM表现不好

Transmission characteristics in channel have resulted in no solution for CM coefficients (e.g., a deep suck-out or echo is too long or too severe)

信道的传输特性导致没有办法调整CM的系数，比如 a deep suck-out 、回声太长，太严重

Upstream impulsive noise is causing wrong or unstable adaption.

上游脉冲噪声造成的错误或自适应不稳定

CM needs to be replaced

CM需要被替换（我的理解是CM坏了）

 State 4. Adaptive equalizer tool is not working correctly because of equipment design or configuration.

因为设备的设计或配置导致预均衡器无法工作

CMs are giving wrong MIB data, but working properly.

CM给出了错误的MIB数据，但是实际工作正常

CMs are giving wrong/no MIB data and not working properly.

CM就没有正常工作，MIB数据错误或根本就没有

Wrong configuration of CMs or CMTS.

错误的配置了CM或CMTS

* The CMTS is not configured for adaptive pre-equalization in the upstream

CMTS没有在上行中做自适应预均衡的配置

* CM includes DOCSIS capable devices STBs and MTAs

具有docsis功能的机顶盒和MTA设备

* Distortion red = static or trending or intermittent

红色畸变 ？没太明白

Support User detects possible service problem by monitoring (proactive) or trouble call (reactive). Analysis tool is used to interrogate the customer’s modem and CMTS for performance information. The performance data is analyzed for radio-frequency reflections to determine approximate problem location. Location information is used to instruct Support User or dispatch a repair technician to resolve the problem.

支持用户通过监视（主动）或故障调用（无效）来检测可能的服务问题。分析工具用于询问客户的调制解调器和CMTS的性能信息。对性能数据进行射频反射分析，以确定近似问题位置。位置信息用于指示支持用户或派遣维修技术人员解决问题。