Call for Contribution

MWIS Working Group

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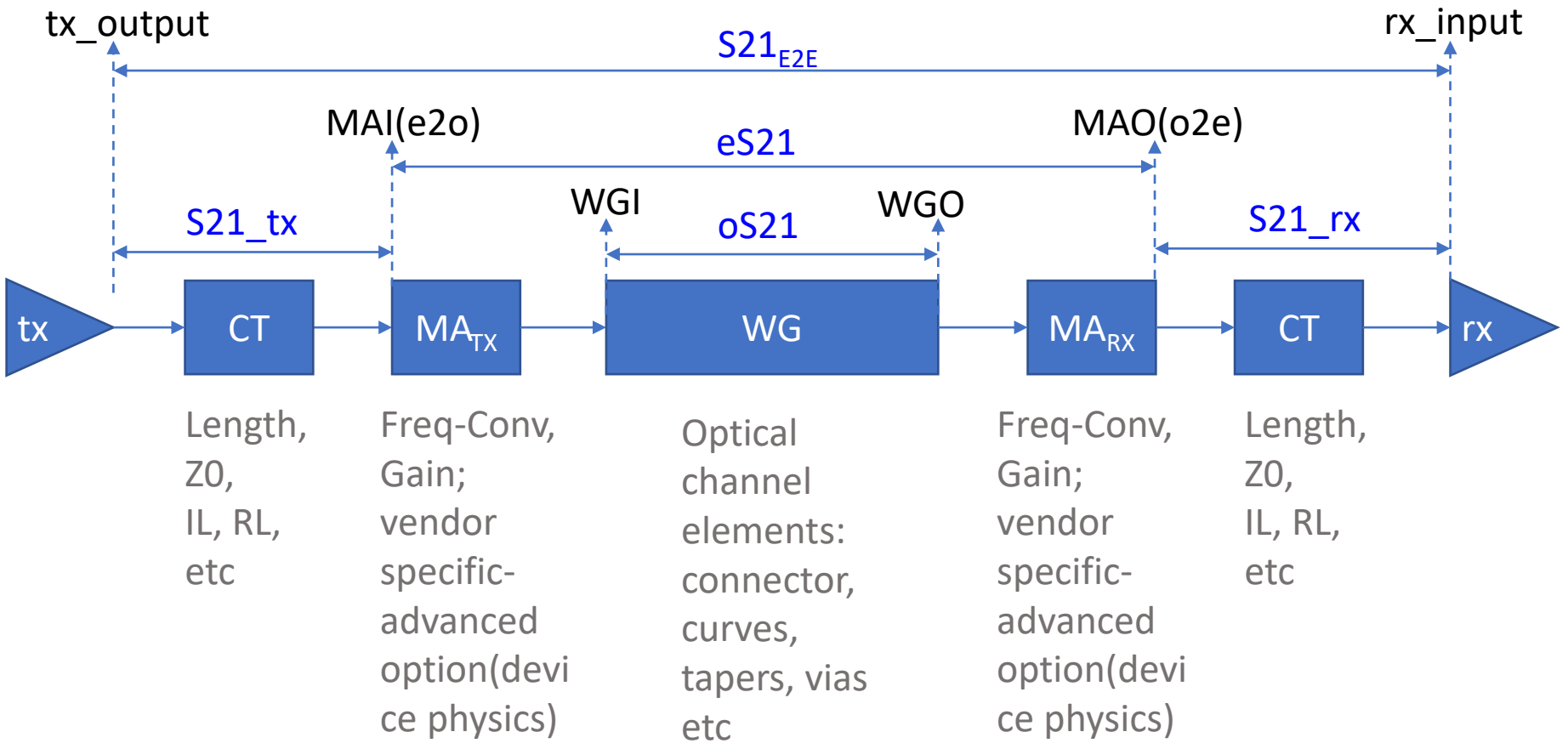
[Background]
CFC: PCB Design Tool or Toolbox for MWIS

- MWIS at COBO is chartered to create a new standard for optical waveguide-embedded-PCB to solve the imminent bandwidth and power issues by removing the copper trace
- Traditional PCB design tool is based on the schematic diagram composed of electrical copper traces and the components, where optical components can be populated and interconnection between optical components are generally implemented by overlay of fibers today.
- Since MWIS use embedded optical waveguide instead of fibers which needs to be part of the PCB manufacturing process, there must be some additional steps to utilize the current EDA tools with polymeric film based optical waveguide.

➢MWIS is now seeking EDA vendors contributions for co-developing MWIS design toolbox for this additional steps

[Channel definition]



WG: Optical Waveguide
- WGI : WG Input
- WGO : WG Output

MA: Media Adaptor
- MAI : MA input at TX
- MAO: MA output at RX

CT: Copper Trace

oS21: Optical S21

eS21: Differential Electrically equivalent optical S21

S21_tx : Differential S21 for tx output -to-MAI

S21_rx : Differential S21 for MAO-to-Rx input

$S21_{E2E}$: Differential End-to-End S21

[CFC: Toolbox for MWIS]
Generic EDA tool for PCB design

1. Routing algorithm could be similar or even same with any existing configurational/design-rule set
   → [Informative] as an optical signal routing algorithm with additional parameters : curvature, spacing/width, height of waveguide parameters, taper, vias etc
2. In situ toolbox for target characteristic impedance calculation for given PCB stack-up is typical for conventional copper trace routing, likewise
   → The waveguide to be routed is assumed to be longitudinally invariant in dimension of given cross-sectional physical shape. [Normative] In situ mode calculation capability of the waveguide shall be provided.
3. In-situ toolbox for S-parameter extraction from routed copper signal trace is typical, likewise
   → [Normative] Translation function of oS21 to eS21 (electrically equivalent oS21), which is based on the given electrical and optical operational parameters, such as optical frequency, optical line width, etc., shall be provided.
   → [Informative] Option can be further equipped at MA by advanced device physics
   → [Informative] Extraction tool of Scattering matrix based on given physical layout of routed waveguide and other optical interconnect elements, such as taper, filter, via, etc., is recommended.
4. Channel simulation
   → [Informative] Electrical S-parameters are collected for TX path (TX-to-MAI); S21_tx and RX path (MAO-to-Rx); S21_rx
   → [Informative] Dropping eS21 in-between S21_tx and S21_rx completes the whole E-O-E channel, $S21_{E2E}$
   → [Informative] Modulation type(NRZ, PAM4, HOM….) should be defined by the tool
   → [Informative] Interface to industry known performance analysis tools (statistical or transient): e.g. COM, SEASIM, SPICE,…

Backup

Embedded Optical Path