1 ANNEX I: D4.2 PUBLIC SUMMARY

A coherent receiver module (CRM) is one of the photonic key technologies to enable the PASSION approach. This deliverable addresses the development strategy of the CRM, and progress on its first development phase.

The concept of the coherent receiver module (CRM) implementation is shown in Figure 1. A set of *M* wavelength division multiplexed (WDM) signals carried in *M* optical fibers are received at the module. The CRM consists of *M* submodules, each representing a dual polarization coherent receiver (DP CO-Rx). Figure 1 also shows the architecture of the submodule.

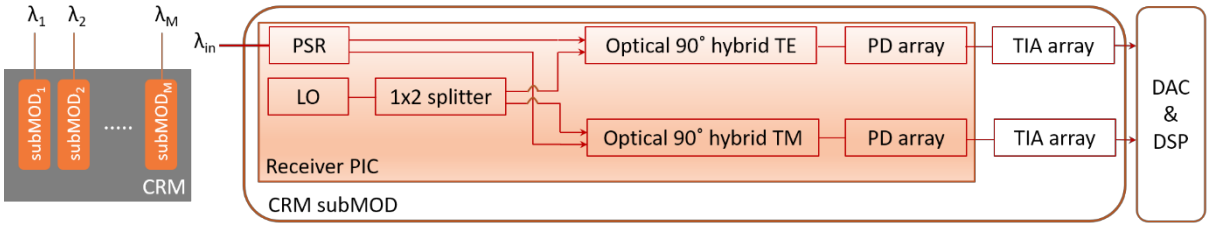

Figure 1. Representation of the modular, scalable dual polarization coherent receiver. Left: coherent receiver module (CRM) consisting of M submodules, each representing a dual-polarization coherent receiver. Right: submodule architecture. PSR: polarization splitter rotator, LO:local oscillator, PD: photodetector, TIA: transimpedance amplifier, DAC: digital to analogue converter, DSP: digital signal processing.

In the realization of the CRM, the fundamental stepping stone is the submodule development where the objective is the monolithic integration of the DP CO-Rx. Therefore, during this development phase, effort has been focused on the design and optimization of each of its constituent building blocks considering that they are meant to be monolithically integrated. Various approaches are considered per building block; modelling and experimental work conform a first set of results.

The several constituent elements of the DP CO-Rx include local oscillator laser, 90-degree hybrid, photodetector and polarization handling on chip. Next to this, the utilization of aluminum based quaternary material systems is explored for improved performance. Hence, at the end, all building blocks need to be co-integrated in harmony, sharing the same material system and minimizing where possible the process steps for a better control. This means that in some cases some trade-offs need to be made but overall the plausible advantages are superior. A monolithic integration approach would greatly facilitate the packaging and hence favor the cost. Yet, this poses a big challenge that will require several iterations and fabrication runs in order to have a full functional circuit. The monolithic integration will be addressed in the next phase of the project.