CLAIMS

1. An injection locked transmitter for an optical communication network, comprising:

a master seed laser source input substantially confined to a single longitudinal mode;

an input data stream;

a laser injected modulator including at least one slave laser having a resonator frequency being injection locked to a frequency of the single longitudinal mode of the master seed laser source;

a first optical circulator in communication with the laser injected modulator and the master seed laser source input;

a second optical circulator in one-way communication with the first optical circulator and in two-way communication with the at least one slave laser; and

an external modulation element disposed between the first optical circulator and the second optical circulator,

wherein the laser injected modulator is configured to receive the master seed laser source input,

wherein the external modulation element is configured to receive the input data stream and an output of the second optical circulator, and

wherein the first optical circulator is in one-way communication with an output of the external modulation element.

2. The transmitter of claim 1, wherein the laser injected modulator is configured to implement direct modulation.

3. The transmitter of claim 1, wherein the laser injected modulator is configured to implement external modulation.

4. The transmitter of claim 1, wherein the at least one slave laser comprises at least one of an LED, a Fabry Perot laser diode, and a vertical-cavity surface-emitting laser.

5. The transmitter of claim 1, wherein the laser injected modulator is configured to implement one of polarization division multiplexing, space division multiplexing, and mode division multiplexing.

6. The transmitter of claim 5, wherein the laser injected modulator is configured to multiplex the master seed laser source input at one of a 90 degree polarization, a 60 degree polarization, a 90 degree polarization, a spiral polarization, a circular polarization, a vortex polarization, or an orbital angular momentum.

7. The transmitter of claim 5, further comprising a polarization beam splitter and a polarization beam combiner disposed between the first optical circulator and the at least one slave laser.

8. The transmitter of claim 7,

wherein the at least one slave laser comprises a first laser diode and a second laser diode,

wherein the first laser diode is configured to receive an x-component of the master seed laser source input, and

wherein the second laser diode is configured to receive a y-component of the master seed laser source input.

9. The transmitter of claim 8, further comprising:

a first optical splitter and optical combiner disposed between the polarization beam splitter and the first laser diode; and

a second optical splitter and optical combiner disposed between the polarization beam splitter and the second laser diode,

wherein the first laser diode comprises a first sub-laser and a second sub-laser,

wherein the second laser diode comprises a third sub-laser and a fourth sub-laser,

wherein the first sub-laser is configured to receive an I-signal of the x-component,

wherein the second sub-laser is configured to receive a Q-signal of the x-component,

wherein the third sub-laser is configured to receive an I-signal of the y-component,

wherein the fourth sub-laser is configured to receive a Q-signal of the y-component.

10. The transmitter of claim 9, further comprising:

a first phase shift element disposed between the first optical splitter and the second sub-laser; and

a second phase shift element disposed between the second optical splitter and the fourth sub-laser.

11. An injection locked transmitter for an optical communication network, comprising:

a master seed laser source input substantially confined to a single longitudinal mode;

an input data stream;

a laser injected modulator including at least one slave laser having a resonator frequency being injection locked to a frequency of the single longitudinal mode of the master seed laser source, wherein the at least one slave laser comprises a first laser diode and a second laser diode;

an optical circulator in communication with the laser injected modulator and the master seed laser source input;

a polarization beam splitter and a polarization beam combiner disposed between the optical circulator and the at least one slave laser;

a first optical splitter and optical combiner disposed between the polarization beam splitter and the first laser diode; and

a second optical splitter and optical combiner disposed between the polarization beam splitter and the second laser diode,

wherein the laser injected modulator is configured to receive the master seed laser source input and the input data stream, and output a laser modulated data stream,

wherein the first laser diode is configured to receive an x-component of the master seed laser source input, and

wherein the second laser diode is configured to receive a y-component of the master seed laser source input,

wherein the first laser diode comprises a first sub-laser and second sub-laser,

wherein the second laser diode comprises a third sub-laser and a fourth sub-laser,

wherein the first sub-laser is configured to receive an I-signal of the x-component,

wherein the second sub-laser is configured to receive a Q-signal of the x-component,

wherein the third sub-laser is configured to receive an I-signal of the y-component,

wherein the fourth sub-laser is configured to receive a Q-signal of the y-component.

12. The transmitter of claim 11, wherein the laser injected modulator is configured to implement direct modulation.

13. The transmitter of claim 11, wherein the laser injected modulator is configured to implement external modulation.

14. The transmitter of claim 11, wherein the at least one slave laser comprises at least one of an LED, a Fabry Perot laser diode, and a vertical-cavity surface-emitting laser.

15. The transmitter of claim 11, wherein the laser injected modulator is configured to implement one of polarization division multiplexing, space division multiplexing, and mode division multiplexing.

16. The transmitter of claim 15, wherein the laser injected modulator is configured to multiplex the master seed laser source input at one of a 90 degree polarization, a 60 degree polarization, a 90 degree polarization, a spiral polarization, a circular polarization, a vortex polarization, or an orbital angular momentum.

17. The transmitter of claim 11, further comprising:

a first phase shift element disposed between the first optical splitter and the second sub-laser; and

a second phase shift element disposed between the second optical splitter and the fourth sub-laser.