

CLAIMS

1. A first layer one link aggregation master configured to control transmission of customer traffic to a receiver, the first layer one link aggregation master comprising:
 - a first port coupled to receive customer traffic;
 - a first channel;
 - a second channel;
 - an aggregation engine coupled to the first and second channels;
 - a first switch circuit coupled to the first port and to the first channel, and configured to communicate the customer traffic from the first port over the first channel to the aggregation engine, the aggregation engine including a splitter circuit configured to use layer one information to segment at least a portion of the customer traffic into a first virtual container and a second virtual container, the aggregation engine further including an encapsulation circuit configured to encapsulate the second virtual container using Ethernet standards for transport over the second channel;
 - a radio access card configured to generate an air frame based on the first virtual container for wireless transmission over a first wireless link of a link aggregation group to the receiver; and
 - a second switch circuit coupled to the second channel, and configured to communicate the Ethernet-encapsulated second virtual container over an Ethernet cable to a slave switching circuit for wireless transmission over a second wireless link of the link aggregation group to the receiver.
2. The master of claim 1, wherein the splitter circuit segments the at least a portion of the customer traffic into the first virtual container to have a first size based on a capacity of the first wireless link and the second virtual container to have a second size based on a capacity of the second wireless link.
3. The master of claim 1, wherein the receiver is a second layer one link aggregation master.
4. The master of claim 1, wherein the aggregation engine includes a field-programmable gate array (FPGA).

5. The master of claim 1, wherein the first and second switch circuits are layer two switch circuits.
6. A first layer one link aggregation master configured to control transmission of customer traffic to a receiver, the first layer one link aggregation master comprising:
- means for receiving customer traffic;
 - means for communicating the customer traffic over a first channel;
 - means for receiving the customer traffic from the first channel and using layer one information to segment at least a portion of the customer traffic into a first virtual container and a second virtual container;
 - means for generating an air frame based on the first virtual container for wireless transmission over a first wireless link of a link aggregation group to a receiver;
 - means for encapsulating the second virtual container using Ethernet standards for transport over a second channel; and
 - means for communicating the Ethernet-encapsulated second virtual container over an Ethernet cable to a slave switching circuit for wireless transmission over a second wireless link of the link aggregation group to the receiver.
7. A method comprising:
- receiving customer traffic;
 - communicating the customer traffic over a first channel to an aggregation engine;
 - using, by the aggregation engine, layer one information to segment at least a portion of the customer traffic into a first virtual container and a second virtual container;
 - generating an air frame based on the first virtual container for wireless transmission over a first wireless link of a link aggregation group to a receiver;
 - encapsulating the second virtual container using Ethernet standards for transport over a second channel; and
 - communicating the Ethernet-encapsulated second virtual container over an Ethernet cable to a slave switching circuit for wireless transmission over a second wireless link of the link aggregation group to the receiver.

8. A first layer one link aggregation master configured to control transmission of customer traffic to a customer device, comprising:

a radio access card configured to receive an air frame based on a first virtual container from a first wireless link of a link aggregation group;

an internal interface switch circuit configured to receive an Ethernet-encapsulated second virtual container from a slave switching circuit, the slave switching circuit having received a second air frame based on the second virtual container from a second wireless link of the link aggregation group;

a first channel;

a second channel coupled to the internal interface switch circuit;

an aggregation engine coupled to the first channel and to the second channel, configured to receive the first virtual container from the radio access card, configured to receive the Ethernet-encapsulated second virtual container from the internal interface switch circuit via the second channel, configured to decapsulate the Ethernet-encapsulated second virtual container to generate the second virtual container, and including an assembly circuit configured to assemble the first virtual container and the second virtual container to generate customer data; and

a customer-facing switch circuit coupled to the first channel, and configured to receive the customer data from the aggregation engine via the first channel and to transmit the customer data over a first port to a customer device.

9. The master of claim 8, wherein the first virtual container has a first size based on a capacity of the first wireless link and the second virtual container has a second size based on a capacity of the second wireless link.

10. The master of claim 8, wherein the aggregation engine includes a field-programmable gate array (FPGA).

11. The master of claim 8, wherein the internal interface switch circuit and the customer-facing switch circuit are layer two switch circuits.

12. A first layer one link aggregation master configured to control transmission of customer traffic to a customer device, comprising:

means for receiving an air frame based on a first virtual container from a first wireless link of a link aggregation group;

means for receiving an Ethernet-encapsulated second virtual container from a slave switching circuit, the slave switching circuit having received a second air frame based on the second virtual container from a second wireless link of the link aggregation group;

means for decapsulating the Ethernet-encapsulated second virtual container to generate the second virtual container;

means for assembling the first virtual container and the second virtual container to generate customer data; and

means for transmitting the customer data to a customer device.

13. A method comprising:

receiving an air frame based on a first virtual container from a first wireless link of a link aggregation group;

receiving an Ethernet-encapsulated second virtual container from a slave switching circuit, the slave switching circuit having received a second air frame based on the second virtual container from a second wireless link of the link aggregation group;

decapsulating the Ethernet-encapsulated second virtual container to generate the second virtual container;

assembling the first virtual container and the second virtual container to generate customer data; and

transmitting the customer data to a customer device.

14. A layer one link aggregation terminal configured to transmit customer traffic to a receiving terminal, the layer one link aggregation terminal comprising:

a first antenna assembly configured to assist in establishing a first wireless link of a link aggregation group with the receiving terminal;

a second antenna assembly configured to assist in establishing a second wireless link of the link aggregation group with the receiving terminal;

an Ethernet cable;

- a first layer one link aggregation master including
 - a first port coupled to receive customer traffic;
 - a first channel;
 - a second channel;
 - an aggregation engine coupled to the first and second channels;
 - a first switch circuit coupled to the first port and to the first channel, and configured to communicate the customer traffic from the first port over the first channel to the aggregation engine, the aggregation engine including a splitter circuit configured to use layer one information to segment at least a portion of the customer traffic into a first virtual container and a second virtual container, the aggregation engine further including an encapsulation circuit configured to encapsulate the second virtual container using Ethernet standards for transport over the second channel;
 - a first radio access card configured to generate a first air frame based on the first virtual container for wireless transmission by the first antenna assembly over the first wireless link to a second terminal; and
 - a second switch circuit coupled to the second channel and to the Ethernet cable, and configured to communicate the Ethernet-encapsulated second virtual container to the Ethernet cable; and
 - a first slave device coupled to the Ethernet cable, and configured to receive the Ethernet-encapsulated second virtual container from the Ethernet cable, the slave device including:
 - a decapsulation circuit for decapsulating the Ethernet-encapsulated second virtual container; and
 - a second radio access card coupled to the decapsulation circuit and to the second antenna assembly and configured to generate a second air frame based on the second virtual container for wireless transmission by the second antenna assembly over the second wireless link to the receiving terminal.

15. A layer one link aggregation terminal configured to transmit customer traffic to a customer device, the layer one link aggregation terminal comprising:

- a master antenna assembly configured to assist in establishing a master wireless link of a link aggregation group with a transmitting terminal;

a slave antenna assembly configured to assist in establishing a slave wireless link of the link aggregation group with the transmitting terminal;

an Ethernet cable;

a first slave, including:

a slave radio access card coupled to the slave antenna assembly and configured to receive a slave air frame based on a slave virtual container over the slave wireless link; and

an encapsulation circuit for encapsulating the slave virtual container to generate an Ethernet-encapsulated slave virtual container;

a slave switching circuit coupled to the Ethernet cable and configured to transmit the Ethernet-encapsulated slave virtual container to the Ethernet cable; and

a layer one link aggregation master including

a master radio access card configured to receive a master air frame based on a master virtual container from the master wireless link;

an internal interface switch circuit configured to receive the Ethernet-encapsulated slave virtual container from the slave;

a first channel;

a second channel coupled to the internal interface switch circuit;

an aggregation engine coupled to the first channel and to the second channel, configured to receive the master virtual container from the master radio access card, configured to receive the Ethernet-encapsulated slave virtual container from the internal interface switch circuit via the second channel, configured to decapsulate the Ethernet-encapsulated slave virtual container to generate the second virtual container, and including an assembly circuit configured to assemble the master virtual container and the slave virtual container to generate customer data; and

a customer-facing switch circuit coupled to the first channel, and configured to receive the customer data from the aggregation engine via the first channel and to transmit the customer data over a first port to a customer device.