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## Multiple Information Exchanging System

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## Multiple Information Exchanging System

### ABSTRACT

This paper describes a method to increase the amount of information transmitted by using multiple transmitting units. The information transmission process happens between two entities namely entity A and entity B. Both the entities are equipped with a set of information transmitting equipment and information receiving equipment. The information transmission-receiving process is performed by utilizing highly directional radio waves. Each entity has four information transmission units and four information receiving units. Each information transmission unit and each information receiving unit are identified as a unique information transmission stream and a unique information receiving stream respectively. By transmitting and receiving multiple streams of information at the same time, multiple amounts of information will be exchanged at a given instance of time.

### BACKGROUND

Communication is an important aspect of the society. Many methods of communication are used. Major communication methods are wired(cable) technology, radio waves technology and LIFI technology. Whichever the communication technology chosen; it is always desirable to exchange a larger amount of information as possible during the communication process in a given amount of time.

### KEYWORDS

Transmitting antenna

Receiving antenna

optical communicating interface

## DESCRIPTION

This paper describes a method to increase the amount of information transmitted by using multiple transmitting units. The information transmission process happens between two entities namely entity A and entity B. Both the entities are equipped with a set of information transmitting equipment and information receiving equipment. The information transmission-receiving process is performed by utilizing highly directional radio waves. Each entity has four information transmission units and four information receiving units. Each information transmission unit and each information receiving unit are identified as a unique information transmission stream and a unique information receiving stream respectively. By transmitting and receiving multiple streams of information at the same time, multiple amounts of information will be exchanged at a given instance of time. there are two variations to the general information transferring method. The general information transferring procedure is described below.

- the method utilizes six types of entities. They are listed below.

Entity types- one:

1. The main information processing computer.

Entity types- two:

2. The bridging computers that connect to the main information processing computer and the node computers. These computers serve as the bridging interfaces between the main information processing computers and the node computers.

Entity types -three:

3. The node computers.

Entity types -four:

4. The information transmitting antennas.

Entity types -five:

5. The information receiving antennas.

Entity types -six:

6. The optical interfaces.

- The descriptions of the entities are given below.

The entity types-one:

The main information processing computer

This type of computer has two types of databases with it. Type one database is to hold the information in the form of a bit stream to be transmitted. Type two database is to hold the information in the form of a bit stream that will be received.

- There are three methods in which the main computer can generate information that will be used to transmit. They are given below.

The method one:

The main computer can create the information to be transmitted within the computer itself.

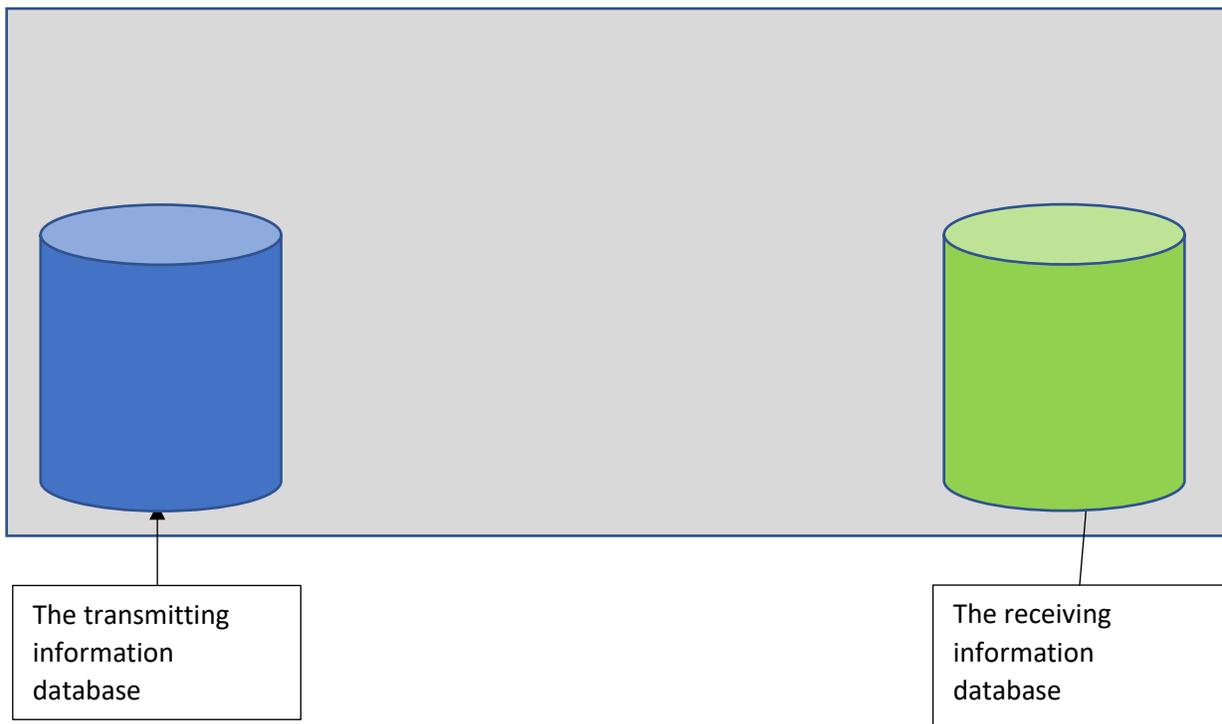
The method two:

The main computer can obtain the information to be transmitted through an external source of information.

The method three:

The main computer can perform method one and method two and then can combine the two kinds of information obtained from two methods into one stream of information.

## Diagram of the main computer

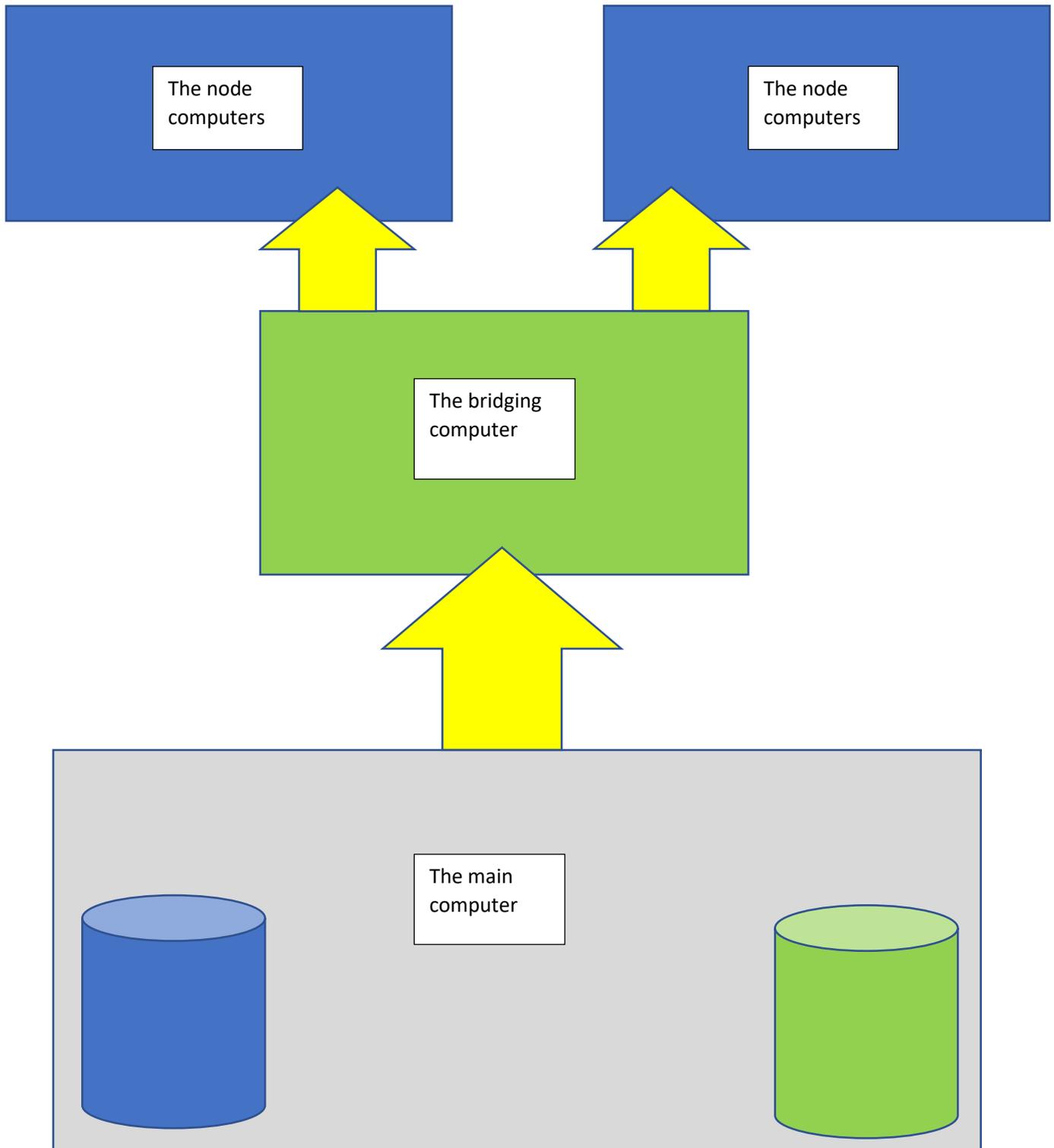


The entity types- two:

The bridging computers that connect to the main information processing computer and the node computers.

This type of computers that connect to the main information processing computers and the node computers. These computers serve as the bridging interfaces between the main information processing computers and the node computers. This is given by the diagram below.

The diagram



The entity types-three:

The node computers.

This type of computers interacts with the bridging computers and the receiving and transmitting antennas. The types of interactions are given below.

Interaction one:

The node computers interact with the bridging computers to obtain the information bit streams to be transmitted.

Interaction two:

The node computers interact with the bridging computers to provide the information bit streams that was received.

Interaction three:

The node computers interact with the transmitting antennas to provide them (the transmitting antennas) with the information bit streams to be transmitted.

Interaction four:

The node computers interact with the receiving antennas to obtain the information bit streams that will be received by them. (The receiving antennas)

Interaction five:

The node computers interact with the bridging computers to receive information bit streams from them (The bridging computers) during the information transmission operation.

Interaction six:

The node computers interact with the bridging computers to provide information bit streams to them (The bridging computers) during the information receiving operation.

Entity types -four:

The information transmitting antennas.

These antennas take information bit streams as inputs from the connected node computers and transmit them.

Entity types -five:

The information receiving antennas.

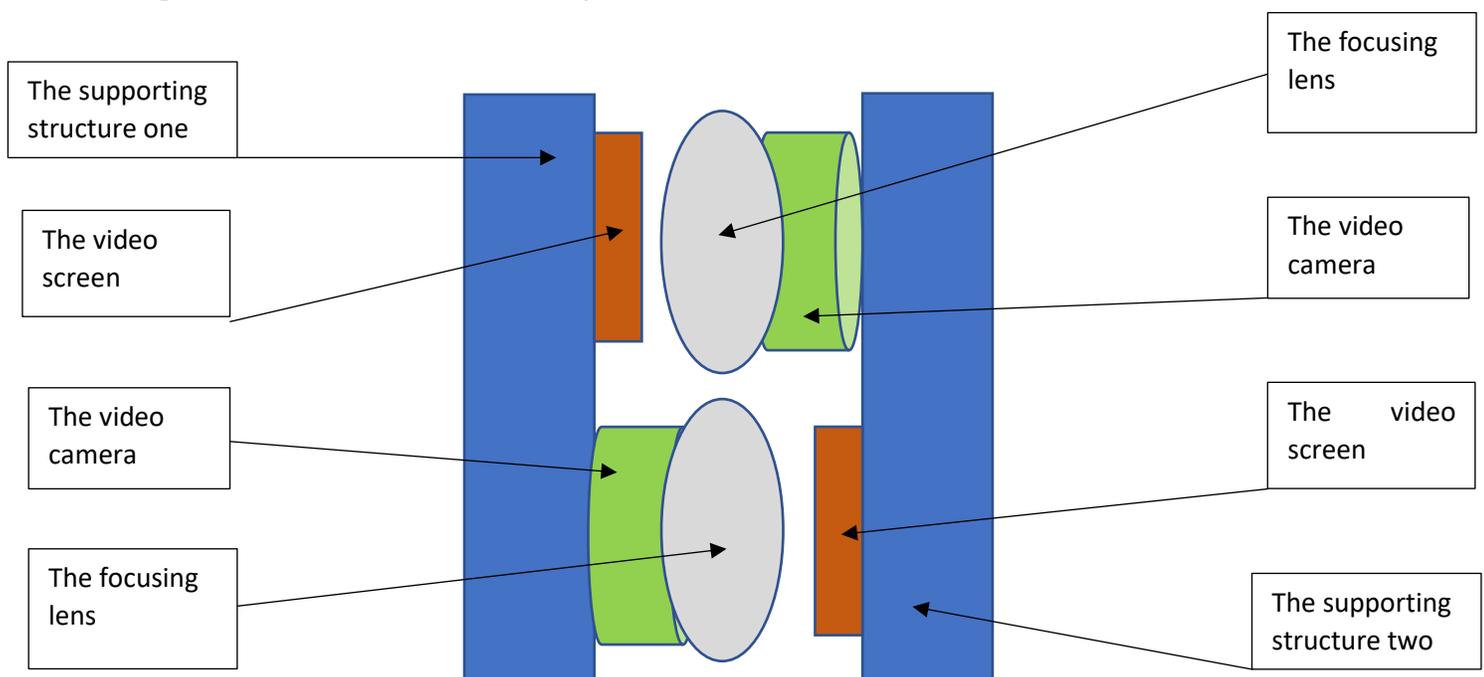
These antennas receive information bit streams and input them into the connected node computers.

Entity types -six:

The optical interfaces.

The optical interfaces are information exchanging nodes. They exchange information in the form of encoded pixel information. The structure of the optical interface is given below.

Diagram: The structure of the optical interface.



- As given by the diagram: the structure of the optical interface,  
It contains eight parts. They are given below.

Part one:

Structure one

Part two:

Video screen of the Structure one

Part three:

Video camera of the Structure one

Part four:

The focusing lens of the Structure one

Part five:

Structure two

Part six:

Video screen of the Structure two

Part seven:

Video camera of the Structure two

Part eight:

The focusing lens of the Structure two

As given by the diagram, the optical information exchange interface consists of eight parts. Their working mechanisms are categorized into two main procedures. The two main procedures are given below.

- Procedure one:

The structure one transferring information in the form of pixel information to the structure two.

- Procedure two:

The structure two transferring information in the form of pixel information to the structure one.

the working mechanisms of each procedure is described below.

- Procedure one: the mechanisms

The structure one transferring information in the form of pixel information to the structure two.

Mechanism one:

The video screen of the structure one, displays a video footage in the form of pixel patterns.

Mechanism two:

The video camera of structure two captures and records the video footage of the pixel patterns in the video screen of structure one. (The video screen that is described in the mechanism one) the convex lens of the structure two will be utilized in focusing the video display of the structure one, so that the video camera of structure two will be able to capture the pixel patterns perfectly. (Of structure one's video screen)

- Procedure two: the mechanisms

The structure two transferring information in the form of pixel information to the structure one.

Mechanism one:

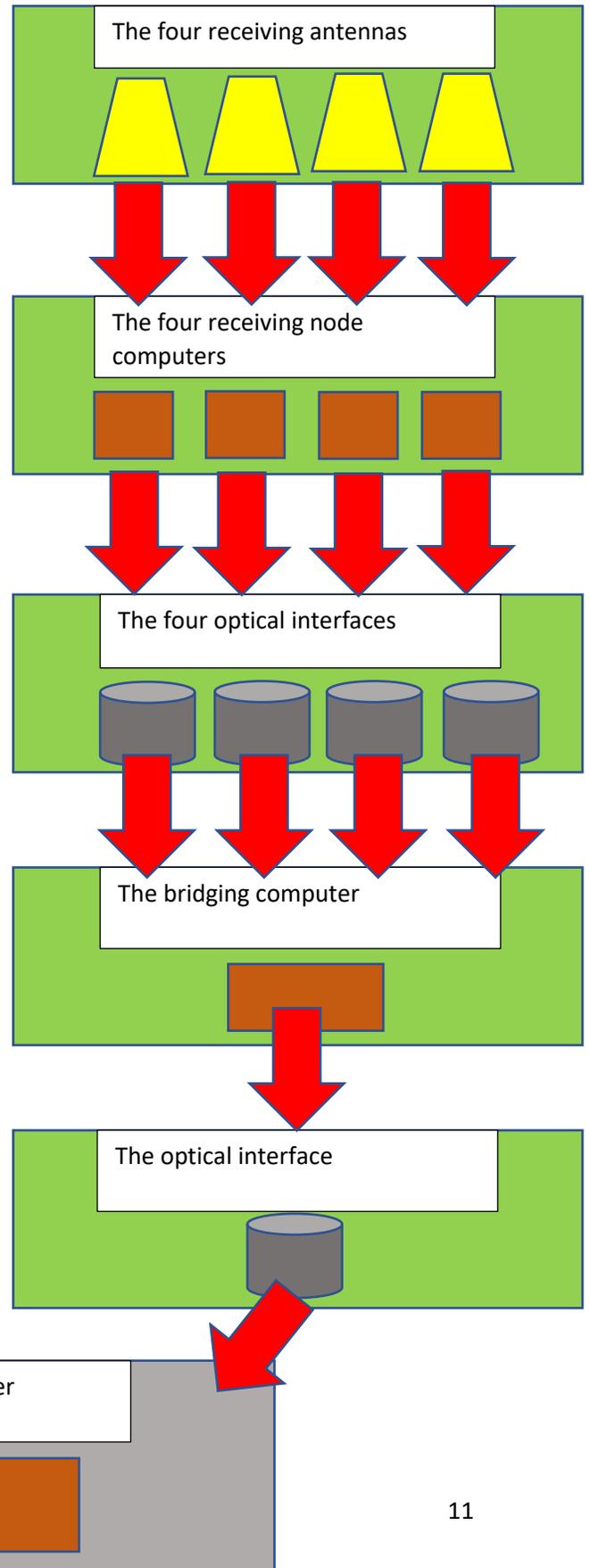
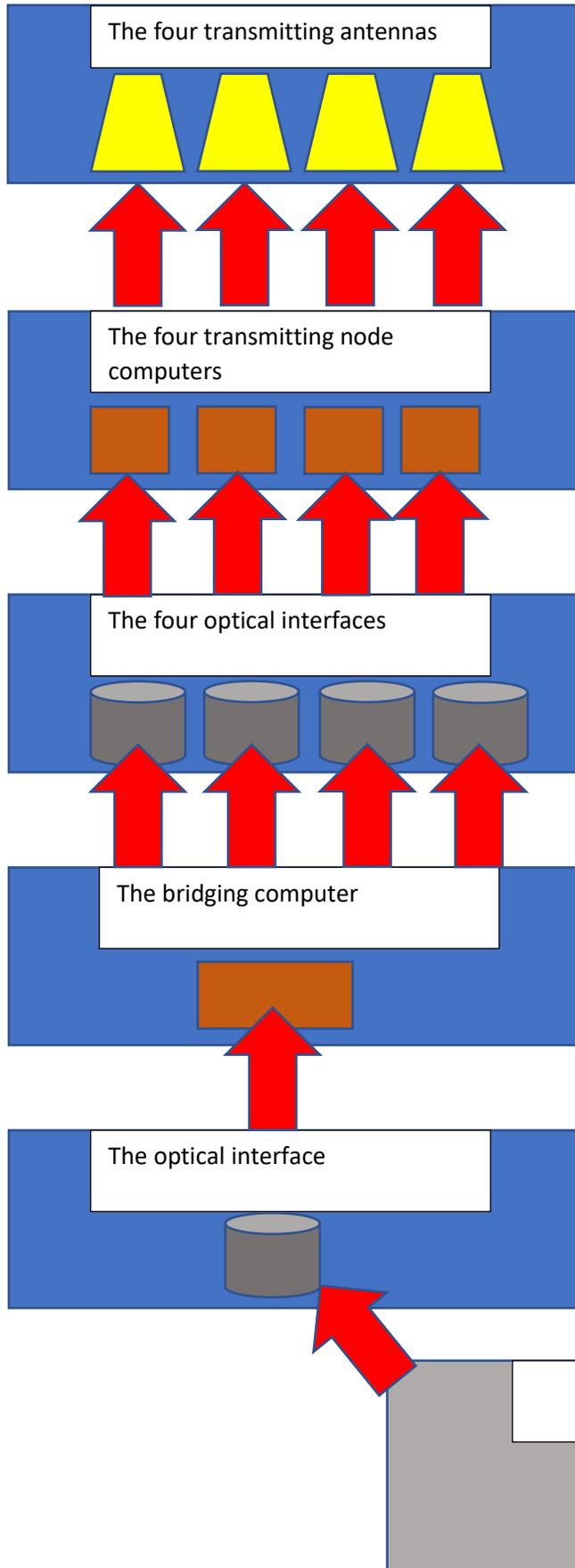
The video screen of the structure two, displays a video footage in the form of pixel patterns.

Mechanism two:

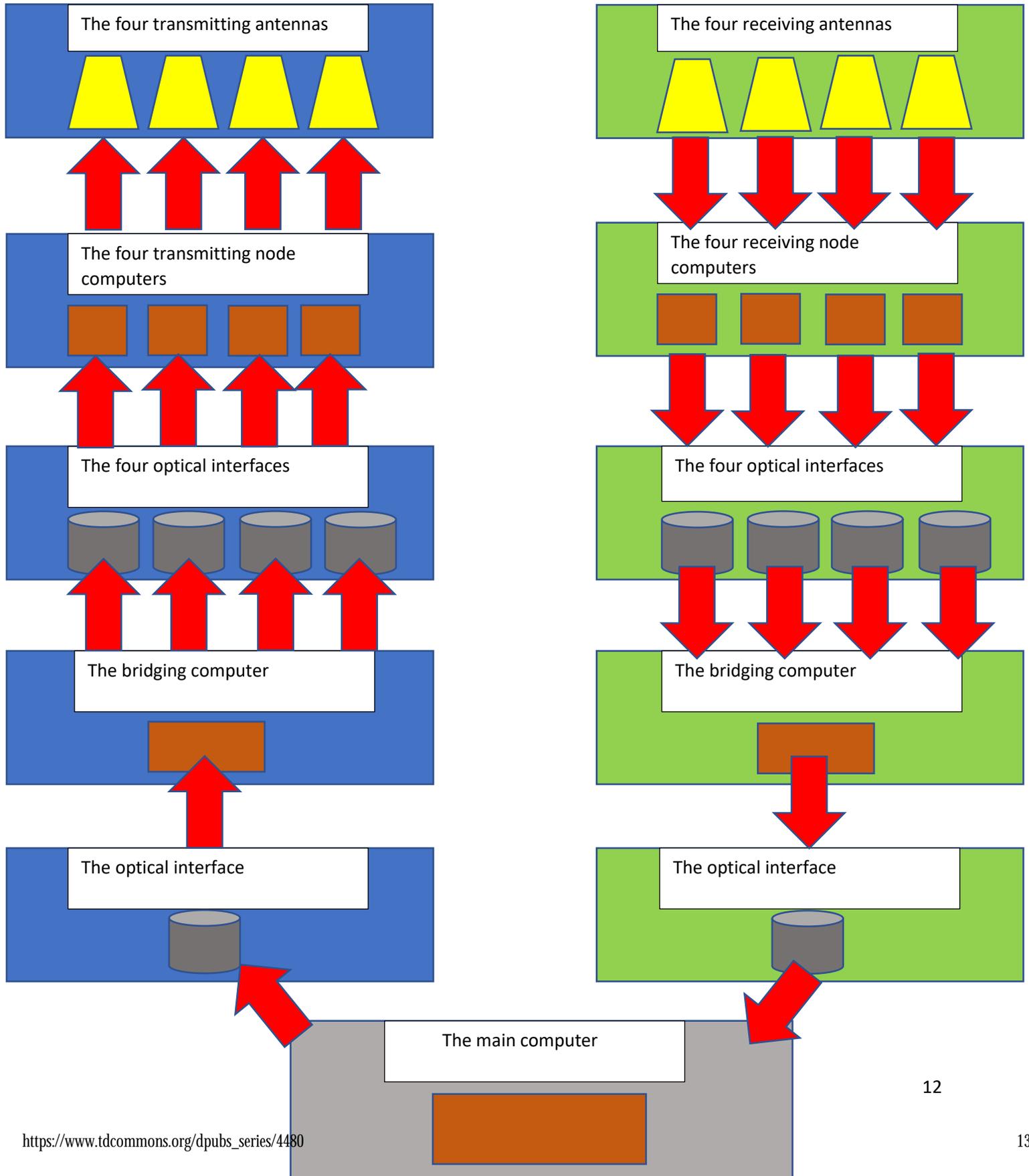
The video camera of structure one captures and records the video footage of the pixel patterns in the video screen of structure two. (The video screen that is described in the mechanism one) the convex lens of the structure one will be utilized in focusing the video display of the structure two, so that the video camera of structure one will be able to capture the pixel patterns perfectly. (Of structure two's video screen)

- The total information transmitting – receiving system is structured into two parts. They are part A and part B. the system diagram for part A is given below.

- The system diagram for part A



The system diagram for part B is given below.



The complete list of all the entities that is utilized in the method is given below.

- The entities in the structure A (part A)

Entity one:

The main information processing computer.

Entity two:

The database of the main information processing computer which stores the transmitting information.

Entity three:

The database of the main information processing computer which stores the received information.

Entity four:

The optical interface connecting the main information processing computer with the bridging transmitting computer.

Entity five:

The optical interface connecting the main information processing computer with the bridging receiving computer.

Entity six:

The bridging computer used for the transmission of information.

Entity seven:

The bridging computer used for the receiving of information.

Entity eight:

Database one of the bridging computer used for the transmission of information.

Entity nine:

Database two of the bridging computer used for the transmission of information

Entity ten:

Database three of the bridging computer used for the transmission of information

Entity eleven:

Database four of the bridging computer used for the transmission of information

Entity twelve:

Database one of the bridging computer used for the receiving of information.

Entity thirteen:

Database two of the bridging computer used for the receiving of information

Entity fourteen:

Database three of the bridging computer used for the receiving of information

Entity fifteen:

Database four of the bridging computer used for the receiving of information

Entity sixteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer one.

Entity seventeen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer two.

Entity eighteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer three.

Entity nineteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer four.

Entity twenty:

The optical interface connecting the receiving bridging computer and the receiving node computer one.

Entity: twenty-one

The optical interface connecting the receiving bridging computer and the receiving node computer two.

Entity twenty-two:

The optical interface connecting the receiving bridging computer and the receiving node computer three.

Entity twenty-three:

The optical interface connecting the receiving bridging computer and the receiving node computer four.

Entity twenty-four:

The transmitting node computer one

Entity twenty-five:

The transmitting node computer two

Entity twenty-six:

The transmitting node computer three

Entity twenty-seven:

The transmitting node computer four

Entity twenty-eight:

The receiving node computer one

Entity twenty-nine:

The receiving node computer two

Entity thirty:

The receiving node computer three

Entity thirty-one:

The receiving node computer four

Entity thirty-two:

The transmitting antenna one

Entity thirty-three:

The transmitting antenna two

Entity thirty-four:

The transmitting antenna three

Entity thirty-five:

The transmitting antenna four

Entity thirty-six:

The receiving antenna one

Entity thirty-seven:

The receiving antenna two

Entity thirty-eight:

The receiving antenna three

Entity thirty-nine:

The receiving antenna four

- The entities in the structure B (part B)

Entity one:

The main information processing computer.

Entity two:

The database of the main information processing computer which stores the transmitting information.

Entity three:

The database of the main information processing computer which stores the received information.

Entity four:

The optical interface connecting the main information processing computer with the bridging transmitting computer.

Entity five:

The optical interface connecting the main information processing computer with the bridging receiving computer.

Entity six:

The bridging computer used for the transmission of information.

Entity seven:

The bridging computer used for the receiving of information.

Entity eight:

Database one of the bridging computer used for the transmission of information.

Entity nine:

Database two of the bridging computer used for the transmission of information

Entity ten:

Database three of the bridging computer used for the transmission of information

Entity eleven:

Database four of the bridging computer used for the transmission of information

Entity twelve:

Database one of the bridging computer used for the receiving of information.

Entity thirteen:

Database two of the bridging computer used for the receiving of information

Entity fourteen:

Database three of the bridging computer used for the receiving of information

Entity fifteen:

Database four of the bridging computer used for the receiving of information

Entity sixteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer one.

Entity seventeen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer two.

Entity eighteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer three.

Entity nineteen:

The optical interface connecting the transmitting bridging computer and the transmitting node computer four.

Entity twenty:

The optical interface connecting the receiving bridging computer and the receiving node computer one.

Entity: twenty-one

The optical interface connecting the receiving bridging computer and the receiving node computer two.

Entity twenty-two:

The optical interface connecting the receiving bridging computer and the receiving node computer three.

Entity twenty-three:

The optical interface connecting the receiving bridging computer and the receiving node computer four.

Entity twenty-four:

The transmitting node computer one

Entity twenty-five:

The transmitting node computer two

Entity twenty-six:

The transmitting node computer three

Entity twenty-seven:

The transmitting node computer four

Entity twenty-eight:

The receiving node computer one

Entity twenty-nine:

The receiving node computer two

Entity thirty:

The receiving node computer three

Entity thirty-one:

The receiving node computer four

Entity thirty-two:

The transmitting antenna one

Entity thirty-three:

The transmitting antenna two

Entity thirty-four:

The transmitting antenna three

Entity thirty-five:

The transmitting antenna four

Entity thirty-six:

The receiving antenna one

Entity thirty-seven:

The receiving antenna two

Entity thirty-eight:

The receiving antenna three

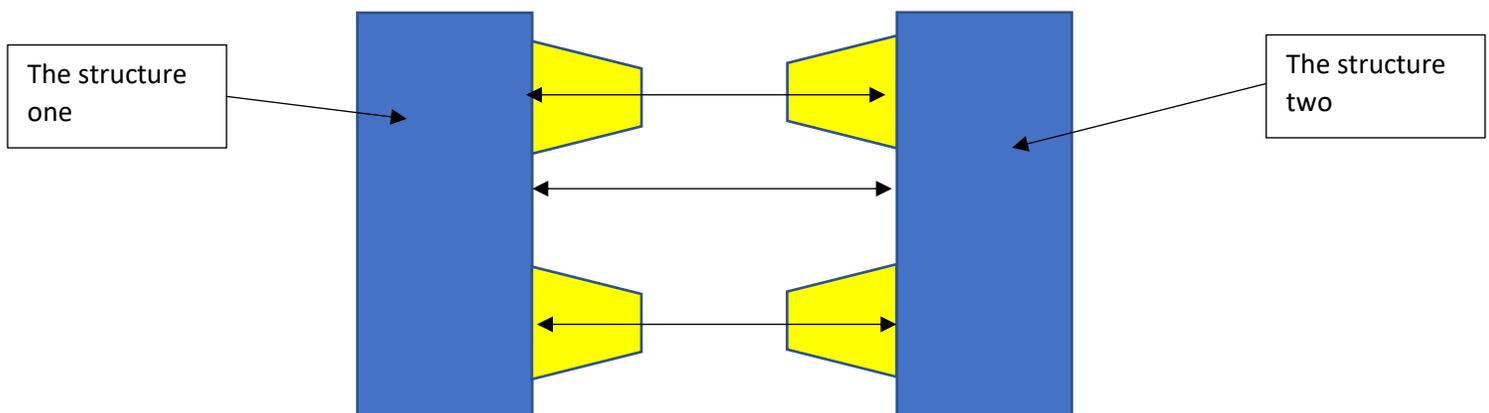
Entity thirty-nine:

The receiving antenna four

The general requirements for the method

Requirement one:

The two structures equipped with highly directional antennas needs to be positioned line of sight with each other in order to exchange information.



As given by the diagram the two structures are positioned in a way that they are in a line-of-sight arrangement with each other. (Including the antennas of the two structures)

Requirement two:

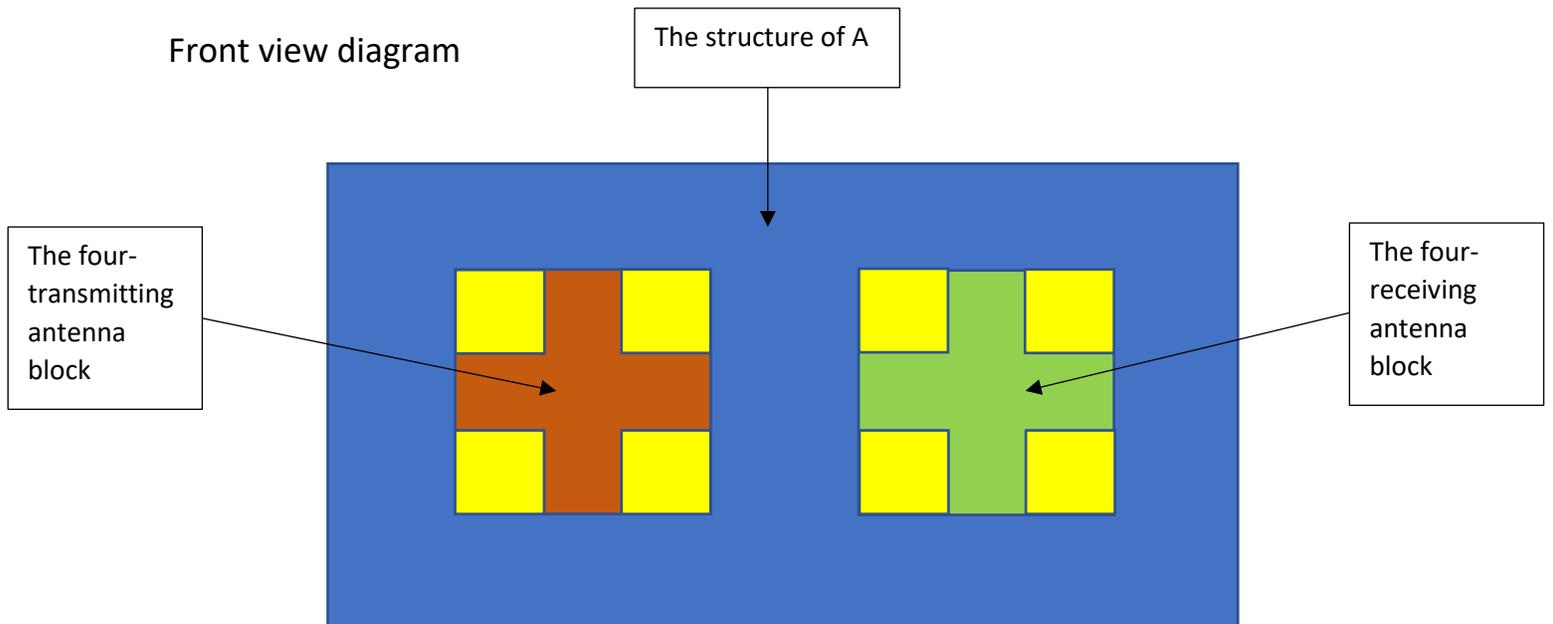
All the antennas used in this method (both transmitting and receiving) are highly directional.

Requirement three:

Each structure should be structured into two parts. One part is allocated to structurally position the four evenly placed transmitting antennas. and the other part is allocated to structurally position the four evenly placed receiving antennas. This is described in the below diagrams. The yellow blocks represent the antennas.

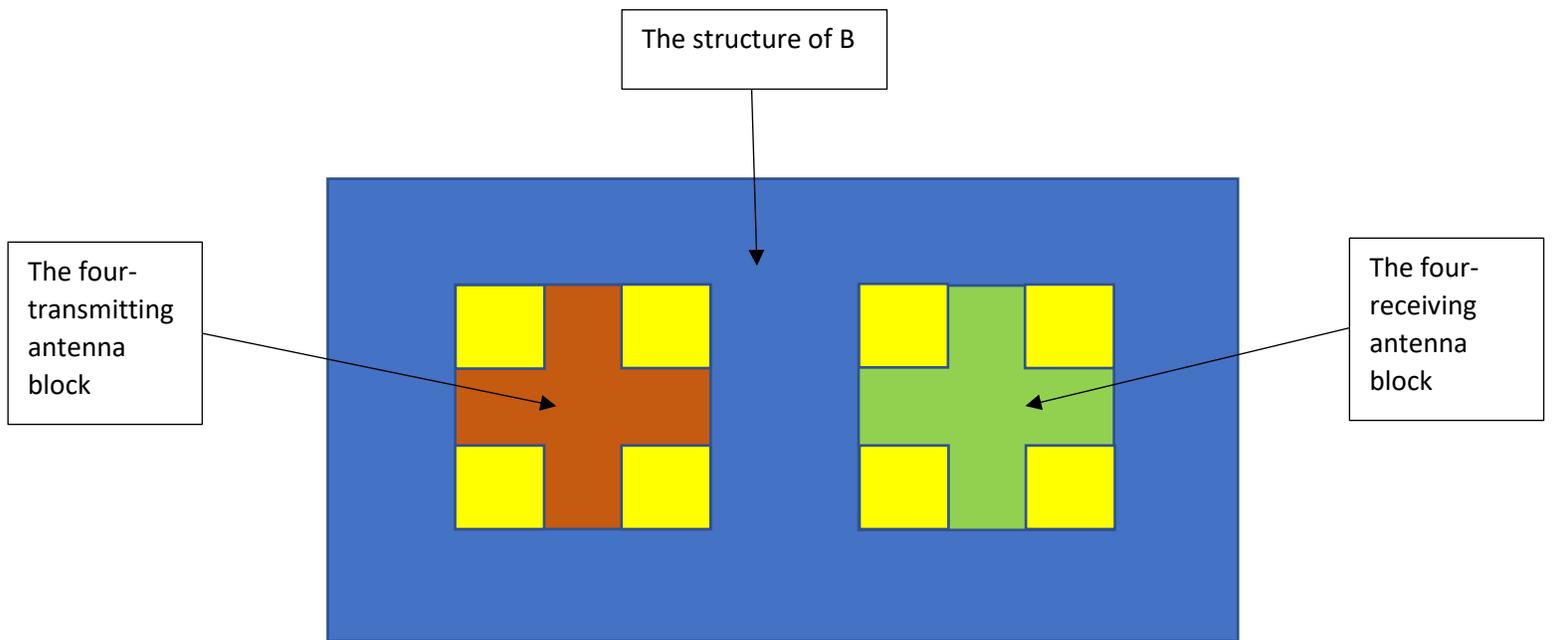
- The structure A

Front view diagram

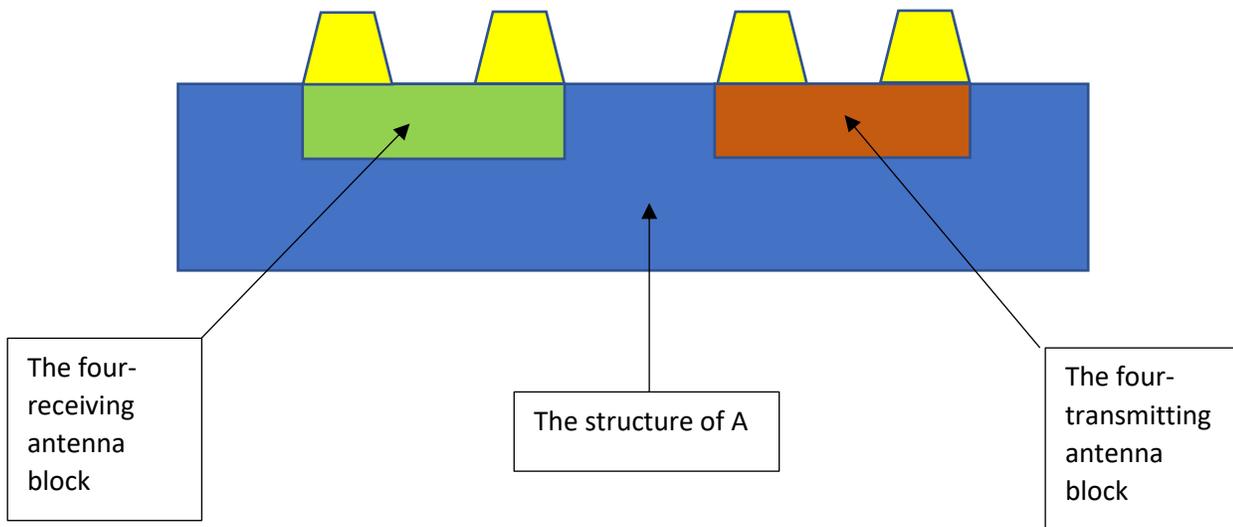


- the structure B

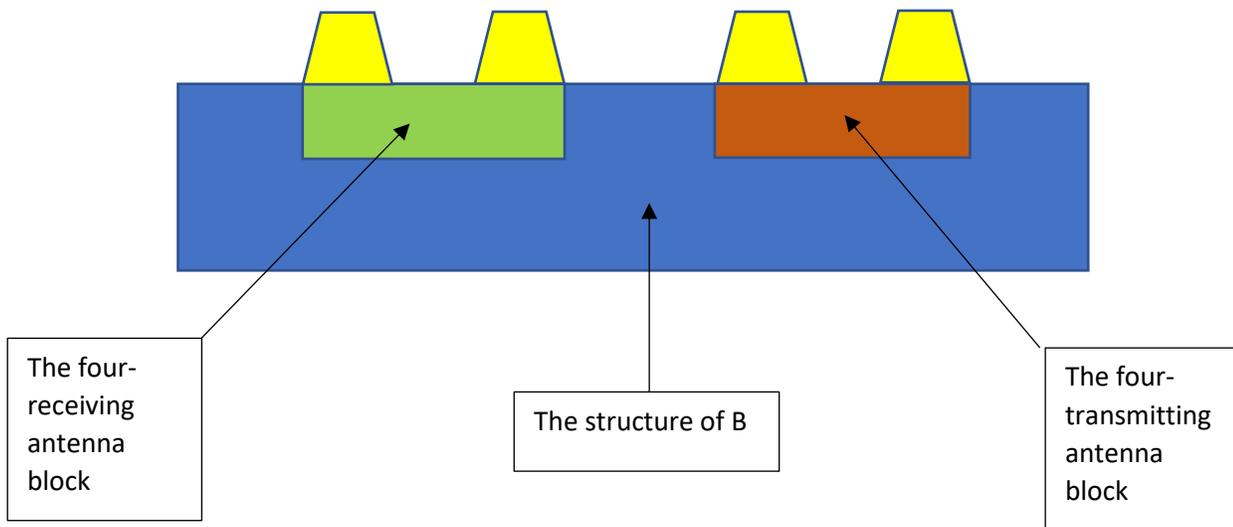
Front view diagram



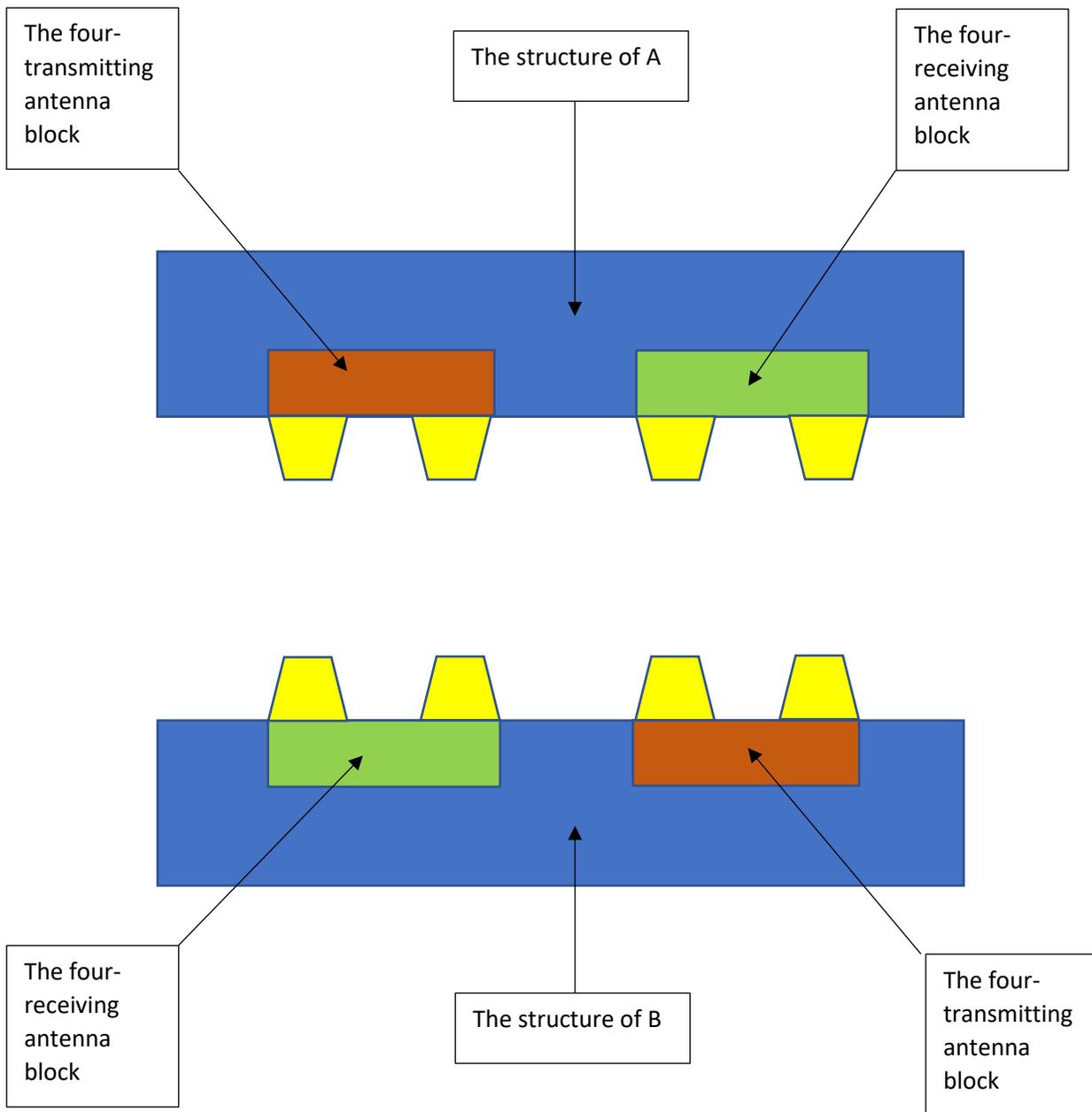
### The top view of structure A



### The top view of structure B



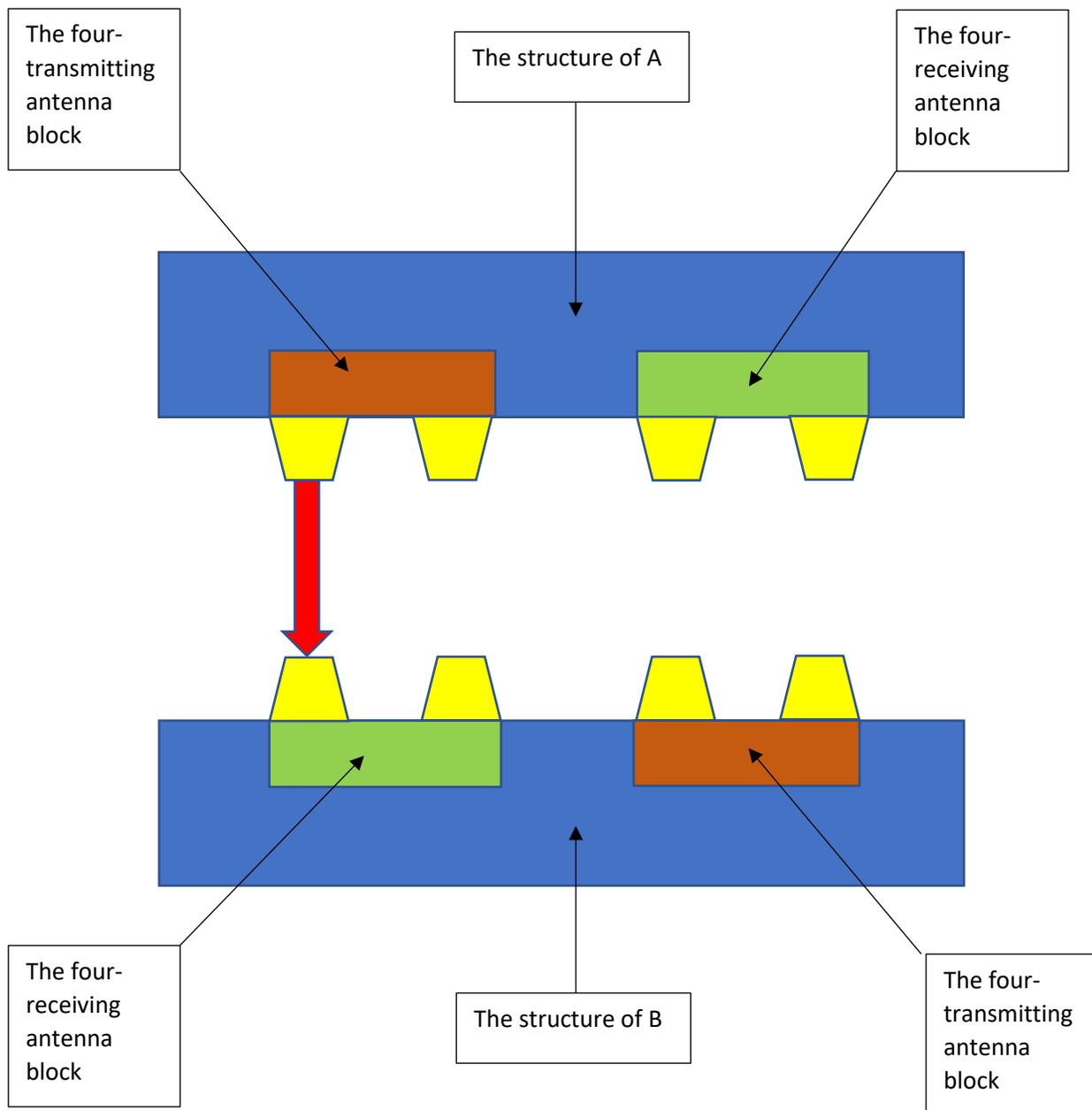
The configuration diagram when both structures are positioned to receive and transmit information.



Requirement four:

The above described two structures that faces each other in a line-of-sight configuration, should have their antennas evenly and adequately spaced apart, so that when one of the transmitting antennas transmit a radio signal, only one of the receiving antennas of the other structure should be able to pick that signal strongly along its radiating axis.

this is given by the diagram below.



The information transfer process involves two variations. They are given below.

Variation one:

Only one information transmitting antenna will be active at a particular instance while all other information transmitting antennas are inactive.

Variation two:

Any combination of information transmitting antennas will be active at a particular instance.

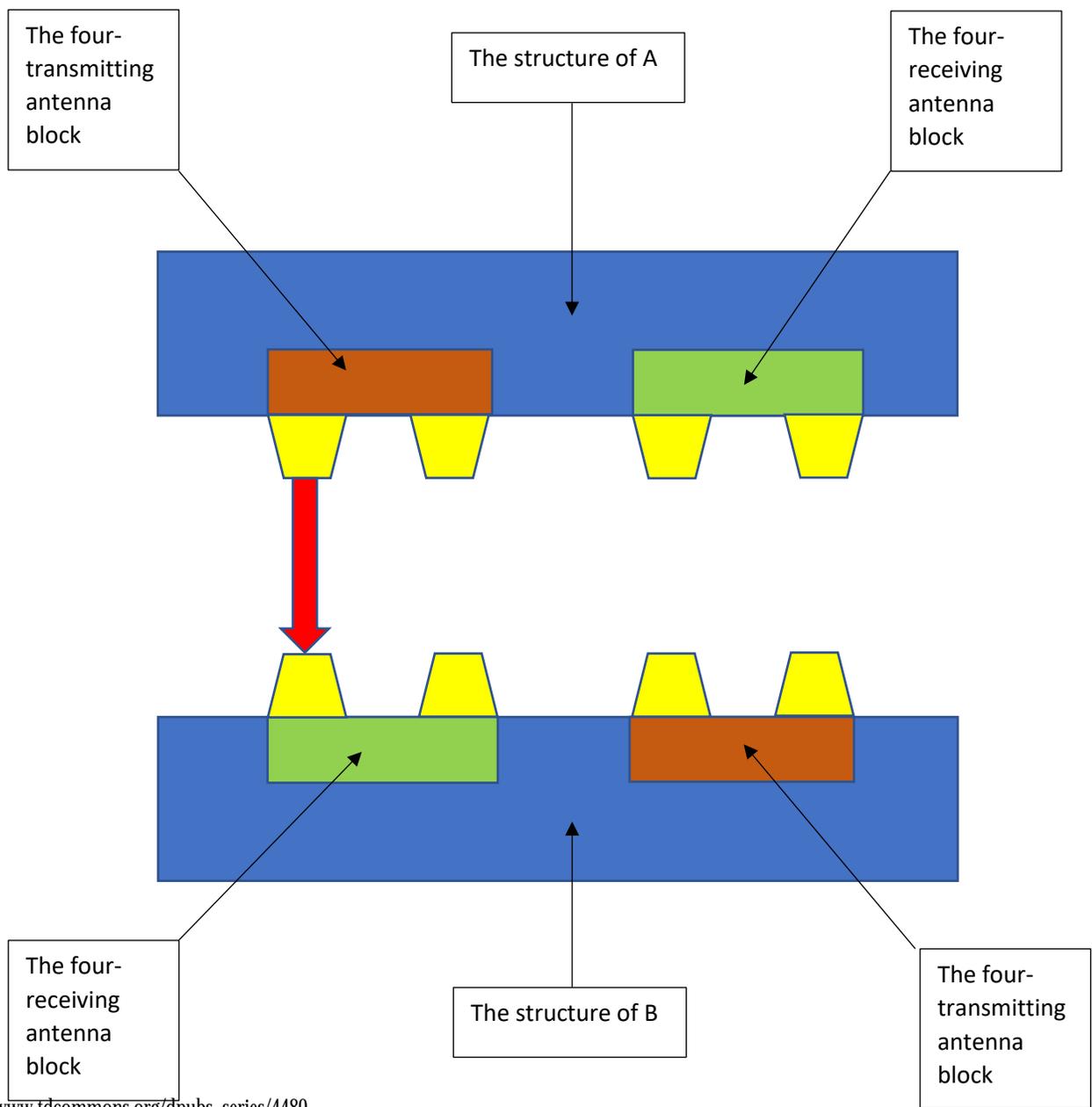
- The descriptions of the two variations are given below.

Variation one:

Only one information transmitting antenna will be active at a particular instance while all other information transmitting antennas are inactive.

: in this variation the two structures are positioned in 3d space as described in the general requirements for the method. Only one of the information transmitting antennas will be active during a particular instance. All other information transmitting antennas will be inactive during that instance. All the information receiving antennas at the other information receiving end (the other structure), will be active and will be constantly monitoring to detect a strong radio signal (strong -intense radiation). This system consists of four transmitting antennas and four receiving antennas for each structure. Therefore, during a particular instance, one of four transmitting antennas will become active and transmit information. At the other end (information receiving end), all the four receiving antennas are active and constantly monitoring for the detection of a strong radio signal (strong-intense radiation). Even though all the four receiving antennas are active and monitoring for a strong radio signal, only one of them will get a strong-intense radio signal at a given instance. This is due to the fact that only one of four transmitting antennas will be transmitting a stream of information at a given

instance of time. When such an antenna transmits the information in the form of a highly directional radio waves (directly in the direction of the facing receiving antenna), the receiving antenna at the other end which is directly receive that highly directional radio waves. (The information stream) This single antenna transmission process is given by the diagram below for one of the transmitting antennas and for the corresponding receiving antenna.



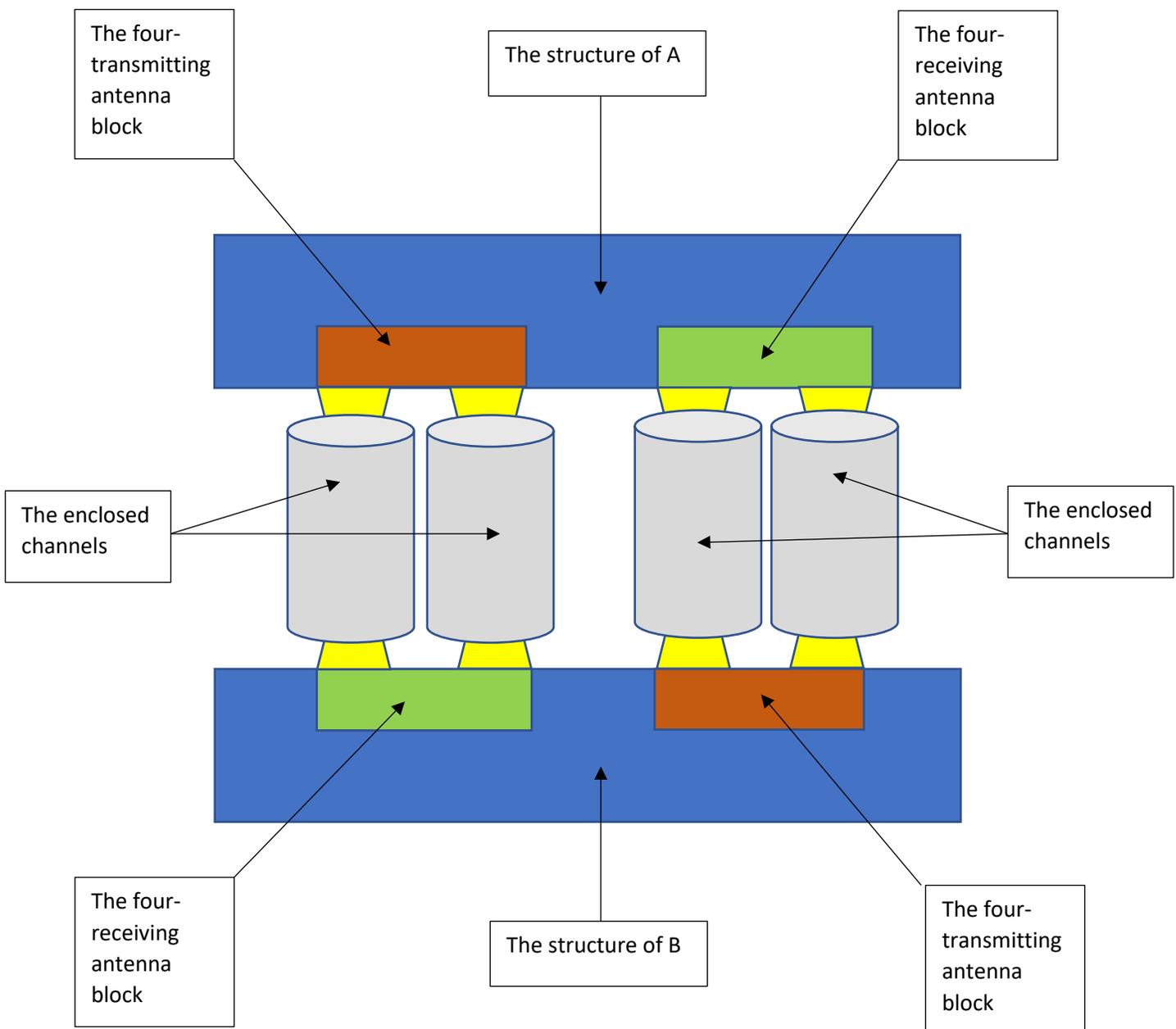
- In this variation the information is encoded in the following manner.

Since its one of four antennas that will transmit an information unit at a given instance, there will be four information representing states in a given unit.

Variation two:

Any combination of information transmitting antennas will be active at a particular instance.

: In this variation in this variation the two structures are positioned in 3d space as described in the general requirements for the method. In addition to the general requirements method, this variation also includes radio waves propagation space surrounding channels between all the antennas that are facing each other. This enhanced configuration is given by the diagrams below. The grey cylindrical areas represent the radio waves propagation space surrounding channels between all the antennas that are facing each other. In this configuration the highly directional radio waves that propagates are enclosed by channels. These enclosed channels will enable the waves to propagate through them while preventing each wave propagation interfering with other propagating waves. Thereby a particular enclosed channel will allow only one particular wave to propagate through that channel.



- In this variation any combination of waves can simultaneously transmit to the receiving end. Since there are four transmitting antennas in this configuration, there are in total sixteen possible combinations possible. That is there are a total of sixteen different ways in which the transmitting antenna array could transmit information in the form of radio waves.
- The general information transfer mechanisms for variation one is described below. The information transfer happens between the structure A and the structure B. structure A will transmit the information as a stream of bits and the structure B will receive the information as a stream of bits.

#### Mechanism one:

The main information processing computer prepares the information needed to be transmit to the structure B. Since there are four transmitting antennas that transmit information (only one at a time), there need to have four different categories of information streams – one for each antenna. The information transmission happens during a pre-configured amount of time and the size of the information bitstream is also of a known pre-configured length. The four categories information bitstreams are given below.

#### Information bitstream category one:

The information bitstream the antenna one should transmit during the transmission time.

Information bitstream category two:

The information bitstream the antenna two should transmit during the transmission time.

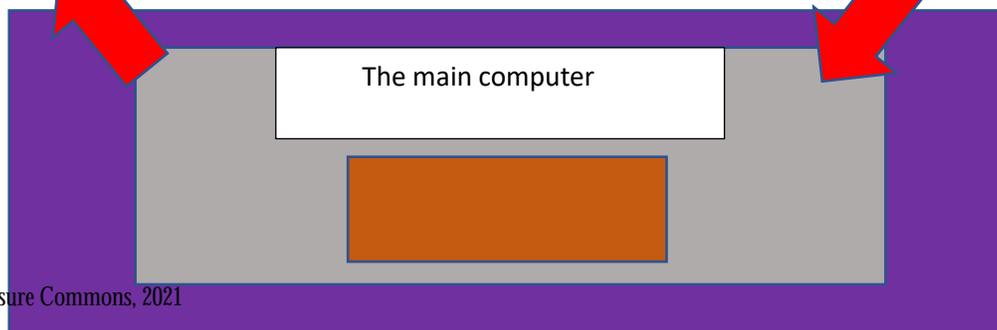
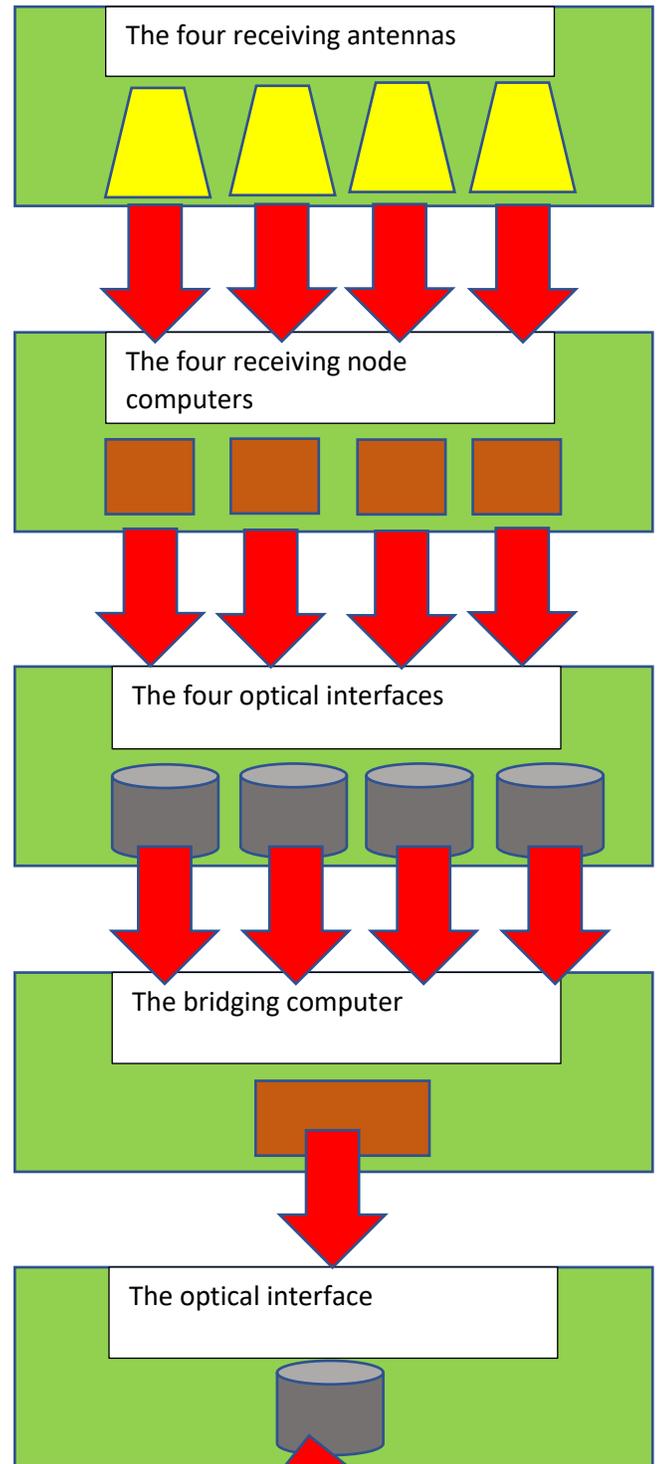
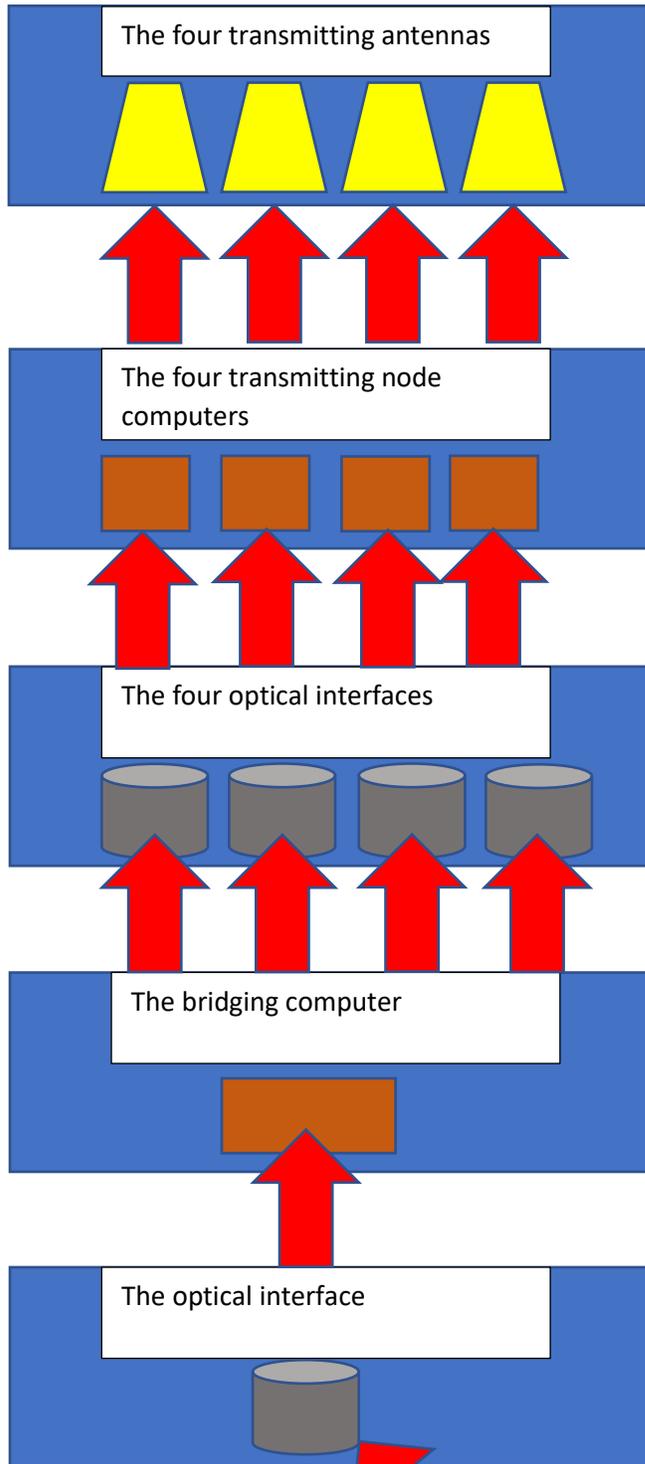
Information bitstream category three:

The information bitstream the antenna three should transmit during the transmission time.

Information bitstream category four:

The information bitstream the antenna four should transmit during the transmission time.

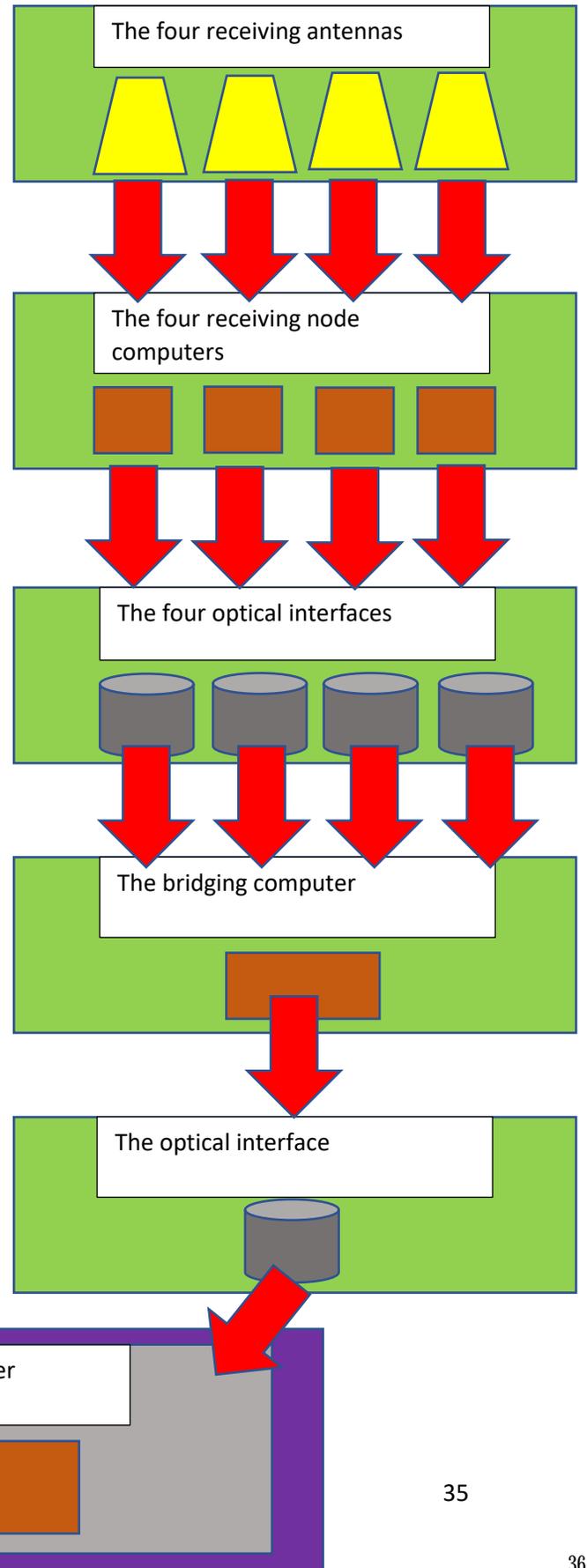
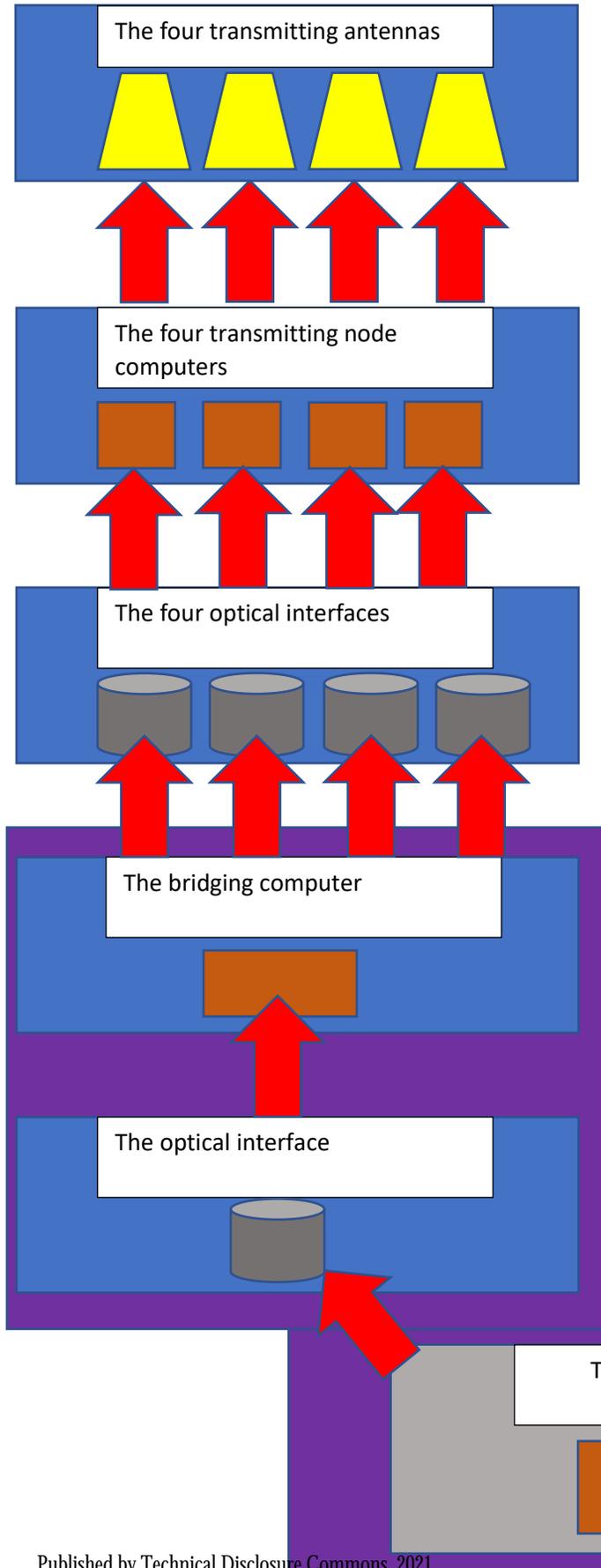
- The entity in the structure A's system which is involved in this mechanism is highlighted in dark purple color in the diagram below.



**Mechanism two:**

The main information processing computer will send transfer these four categories of information to the bridging computer used for the transmission process via the optical interface during a pre-configured amount of time. The optical interface in transferring this information streams categories, will function as described in the procedure set- in the entity type six - in the entity types that are utilized in the method.

The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.



The mechanism three:

The bridging computer used in transmission will transfer the four categories of information bit streams to the four transmitting node computers during a pre-configured amount of time. The transmission occurs via four optical interfaces. The information stream categories transferring procedure is structured like below.

Transfer procedure one:

The information stream that is allocated for the antenna one will be transferred to the node computer one via the optical interface one.

Transfer procedure two:

The information stream that is allocated for the antenna two will be transferred to the node computer two via the optical interface two.

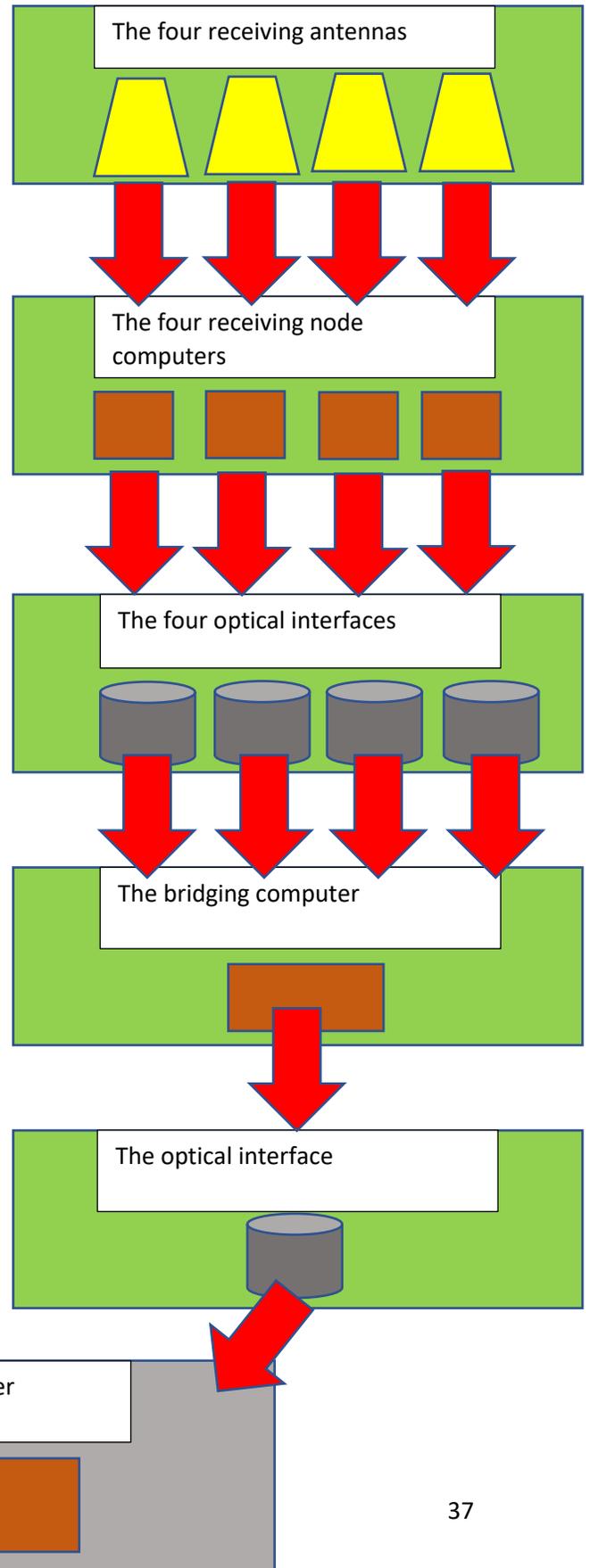
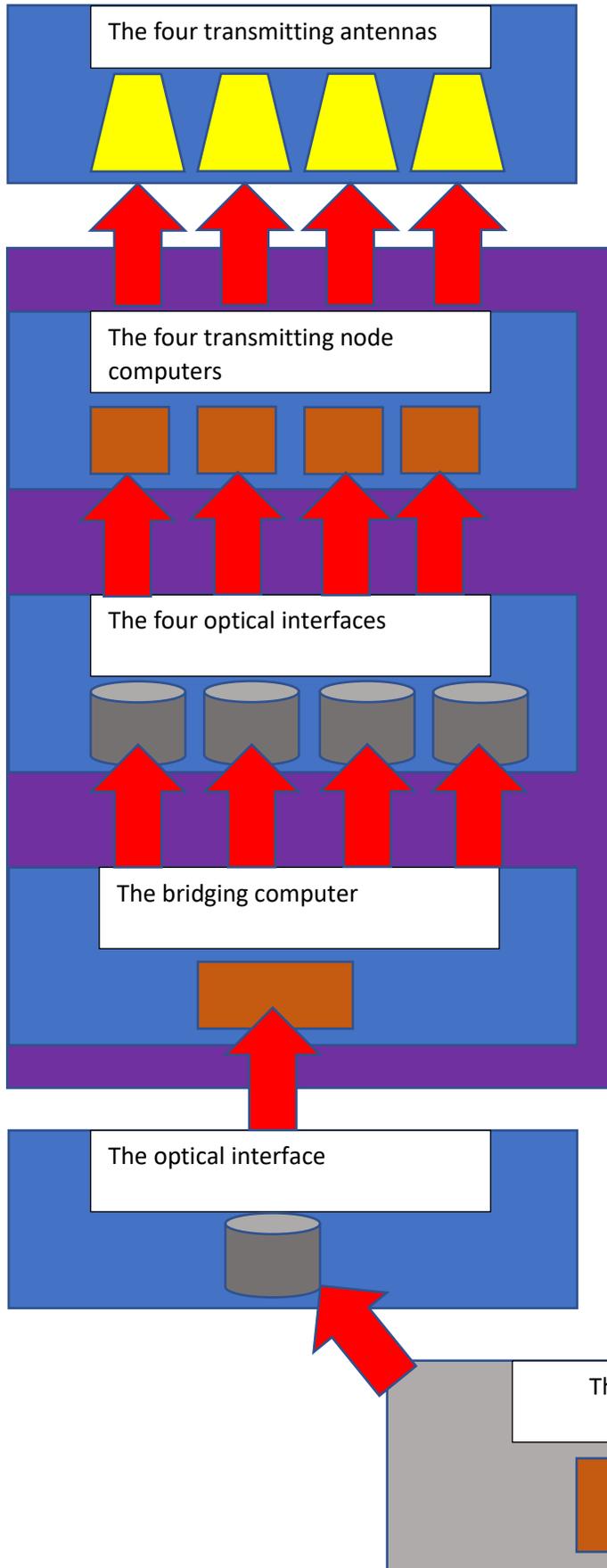
Transfer procedure three:

The information stream that is allocated for the antenna three will be transferred to the node computer three via the optical interface three.

Transfer procedure four:

The information stream that is allocated for the antenna four will be transferred to the node computer four via the optical interface four.

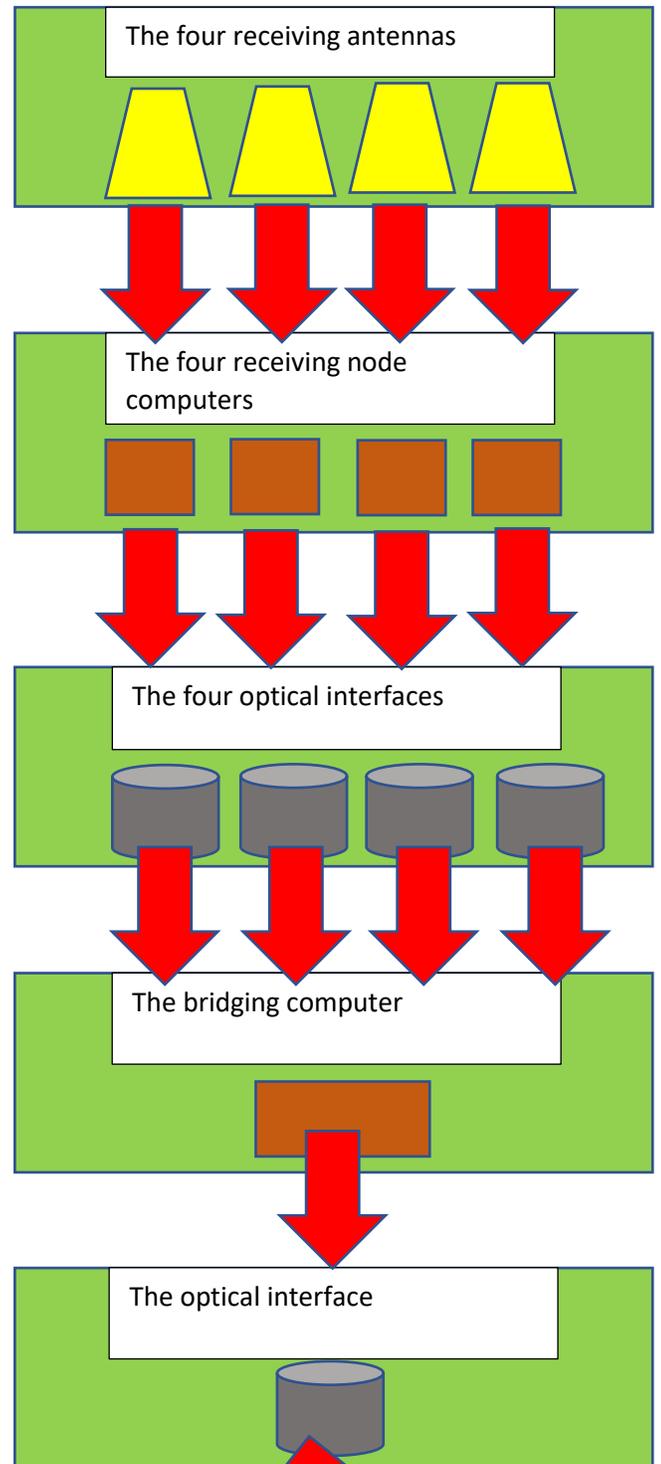
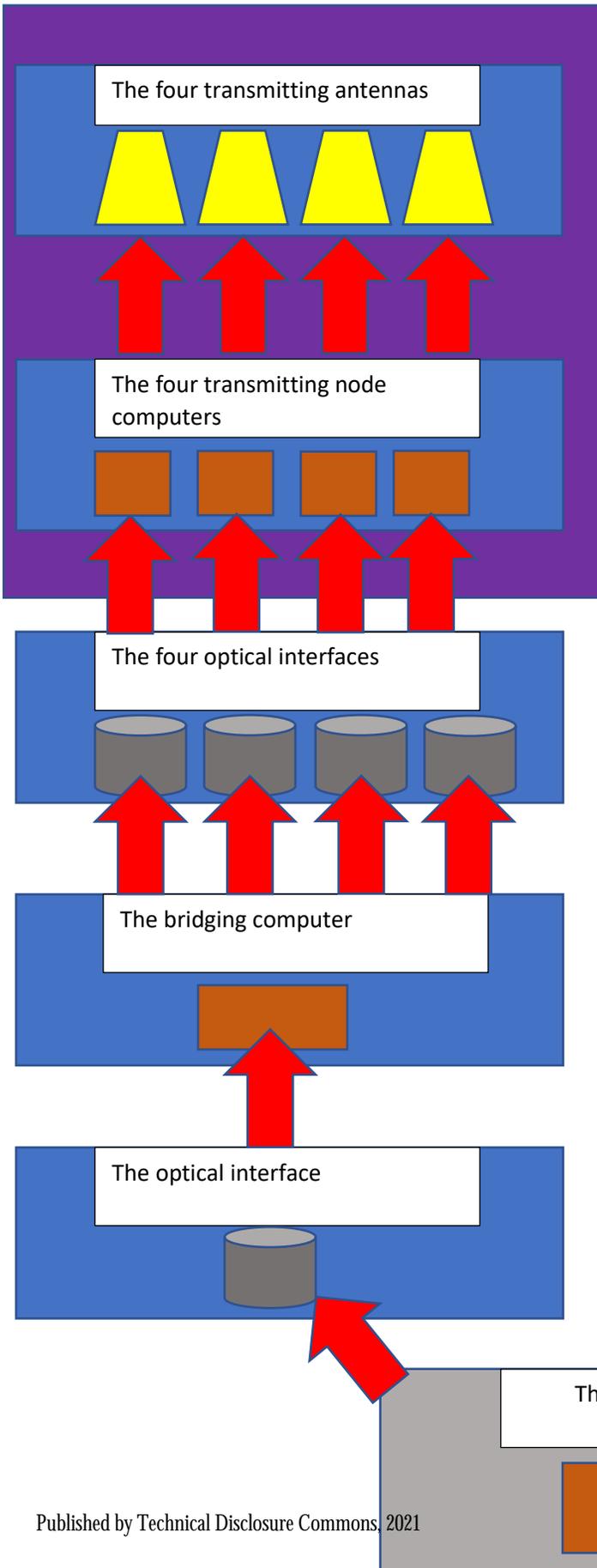
The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.



The mechanism four:

The four node computers used in the transmission process will transfer the four categories of information bit streams to the four transmitting antennas.

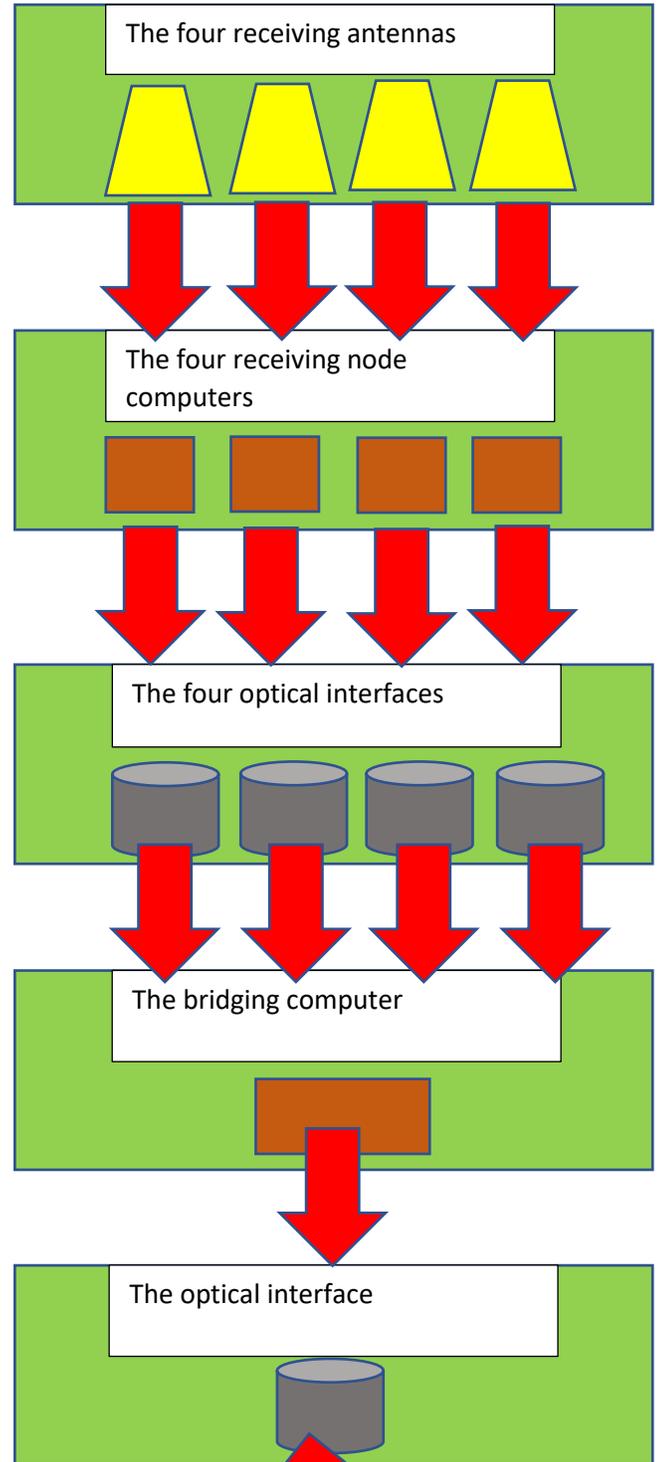
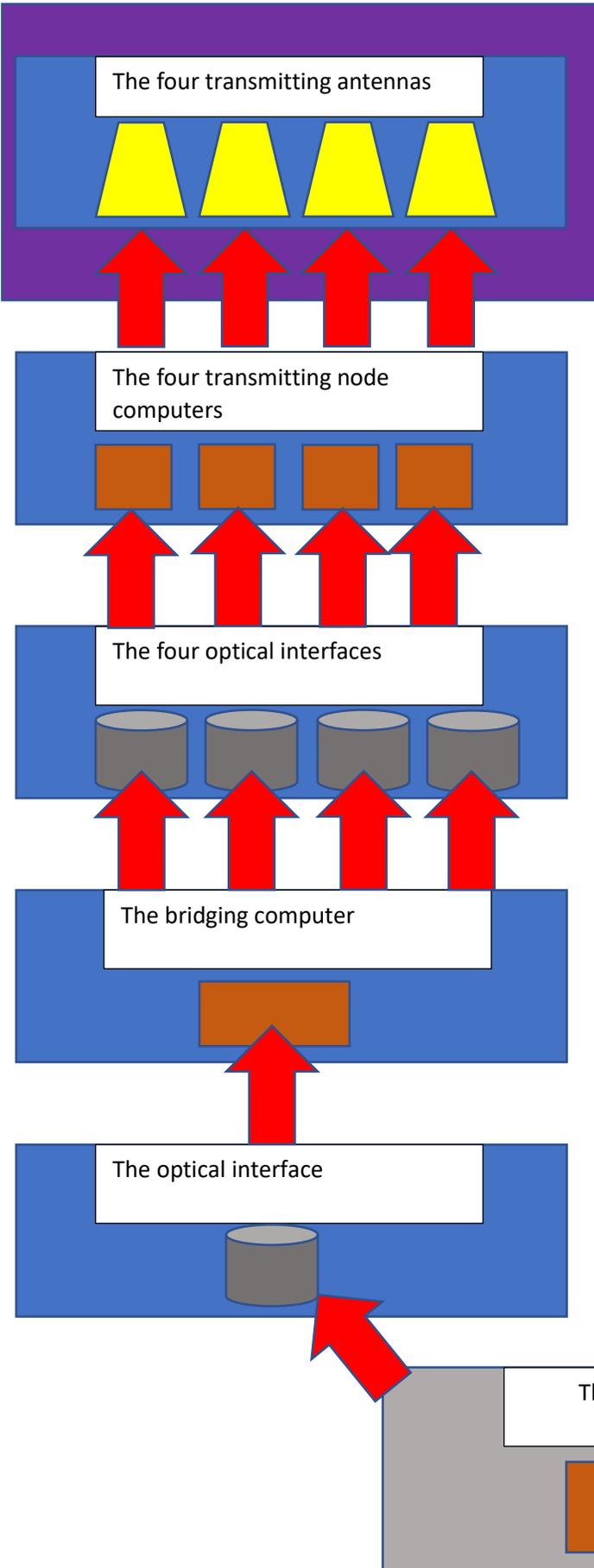
The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.

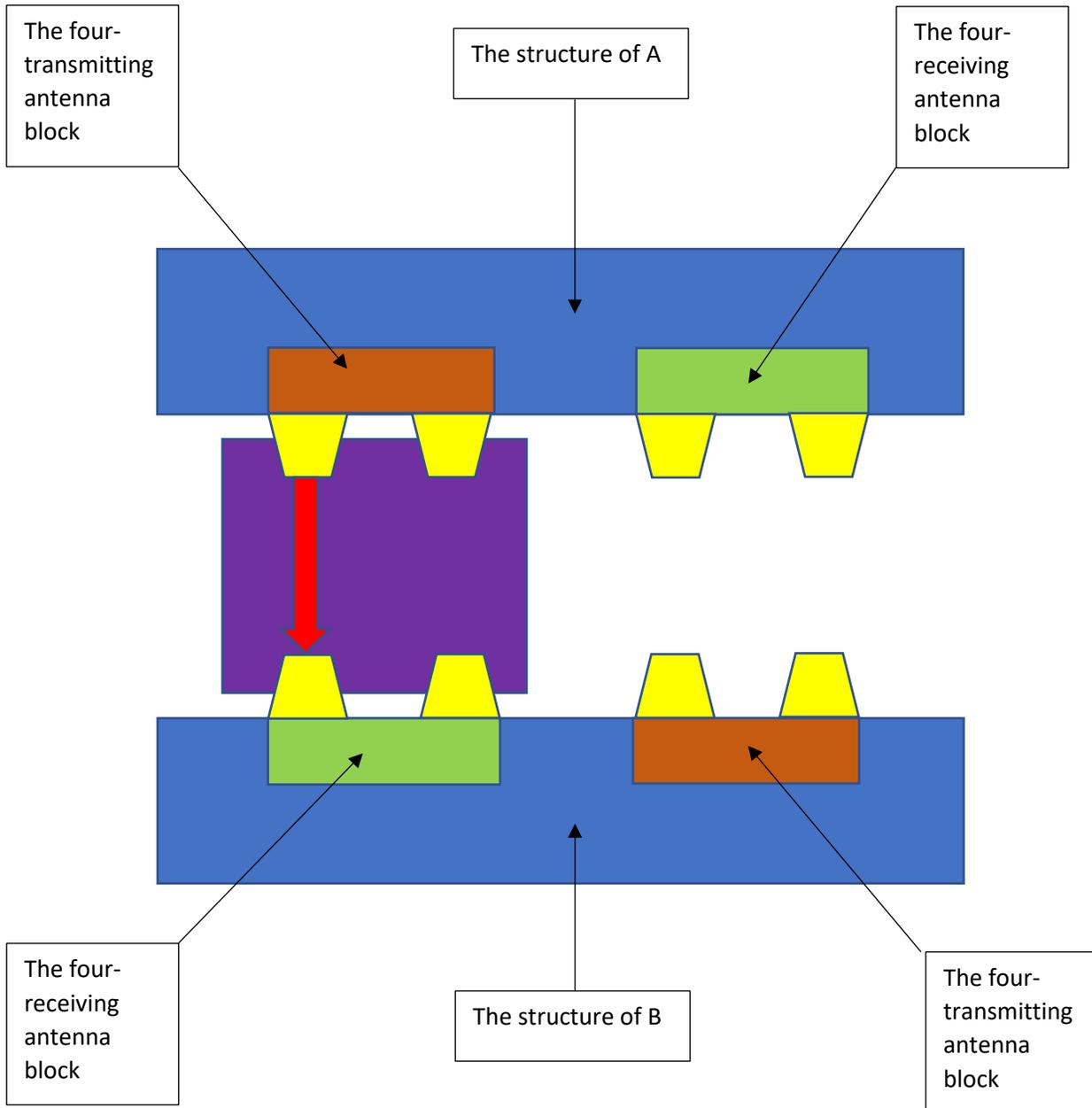


mechanism five:

the four transmitting antennas will transmit the information streams to the structure B's receiving antennas during the pre-configured amount of time according to the information bit stream transferring mechanism fed into it. As mentioned before, only one antenna will have a transmitting strong directional signal (equivalent to a binary value of one-high) at a given instance. Thereby only one of four receiving antennas of the structure B will detect this strong directional radio signal transmitted by one of the transmitting antennas of the structure A at a given instance.

The entities that are involved in this mechanism are highlighted in dark purple color in the diagrams below.



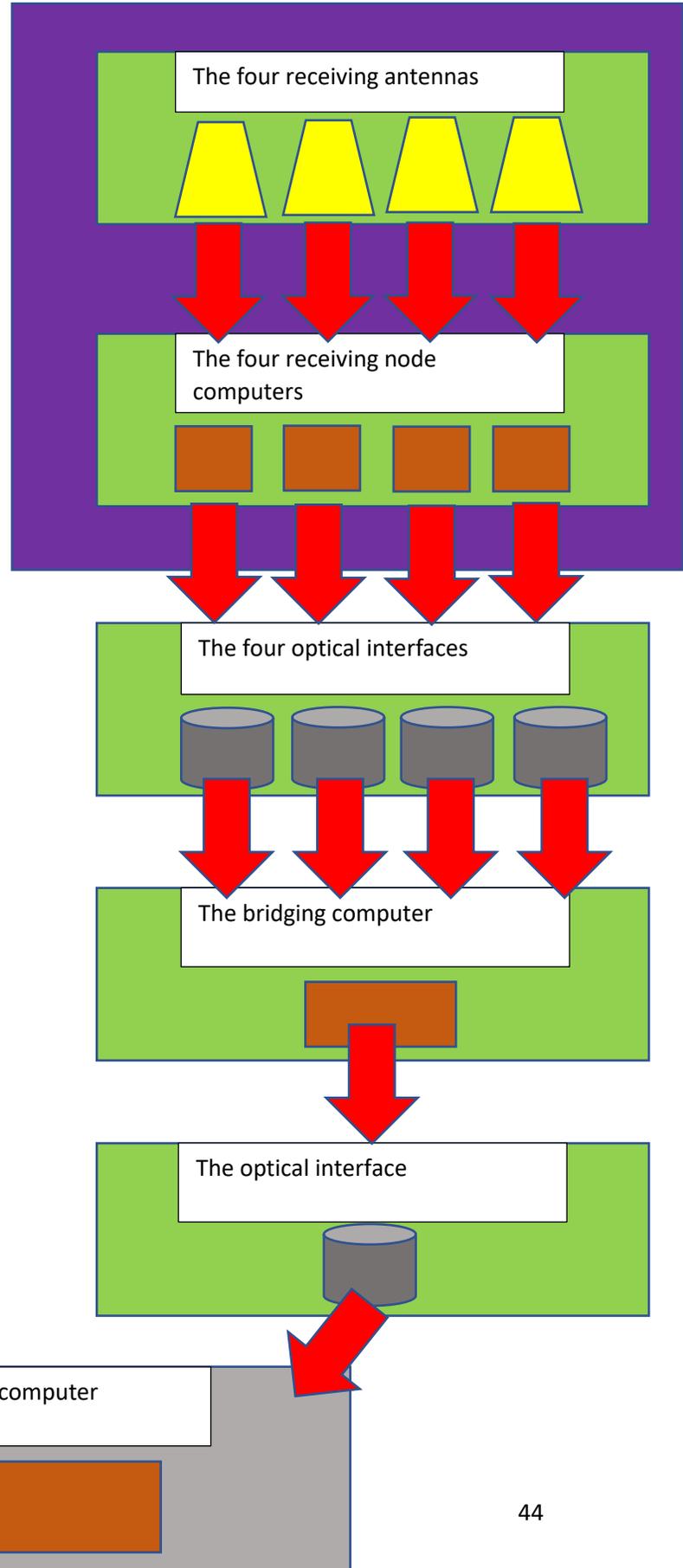
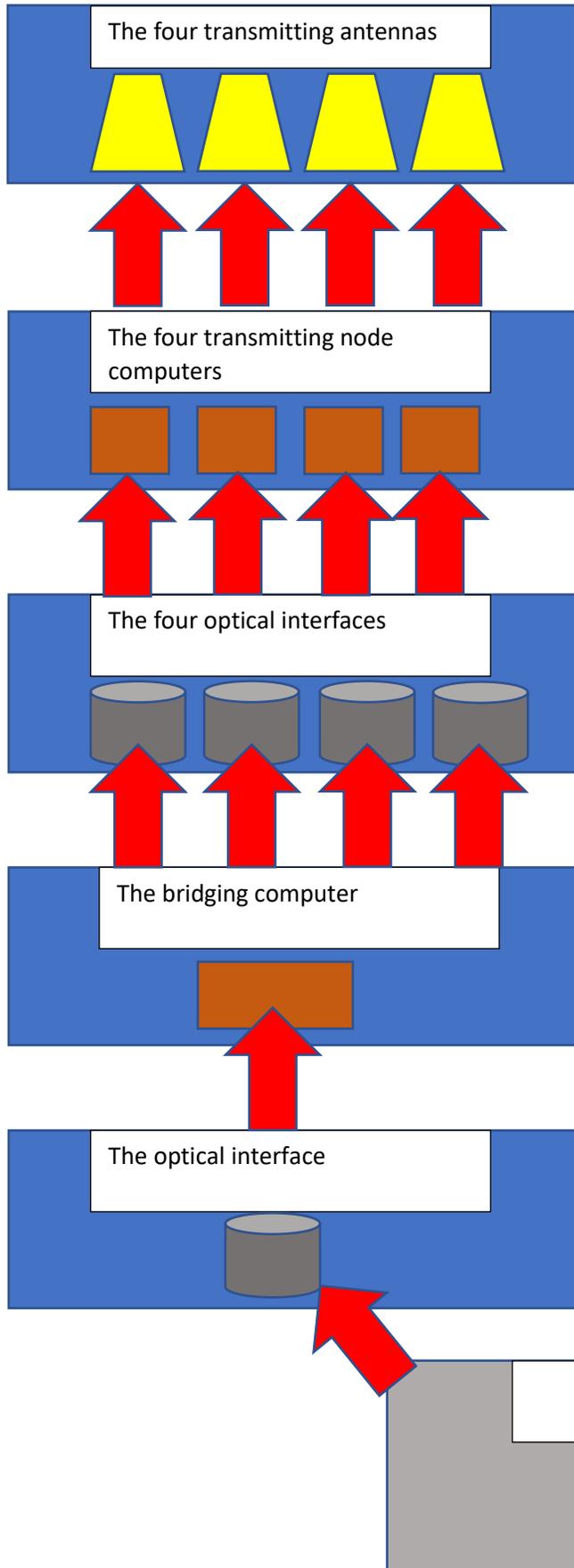


- At the structure B,

Mechanism six:

The information transmitted in the form of highly directional radio waves by the transmitting antennas of structure A, will be received by the corresponding receiving antennas of the structure B. upon receiving the transmitted information during the pre-configured amount of time, the four antennas will transfer the information to the receiving computer nodes.

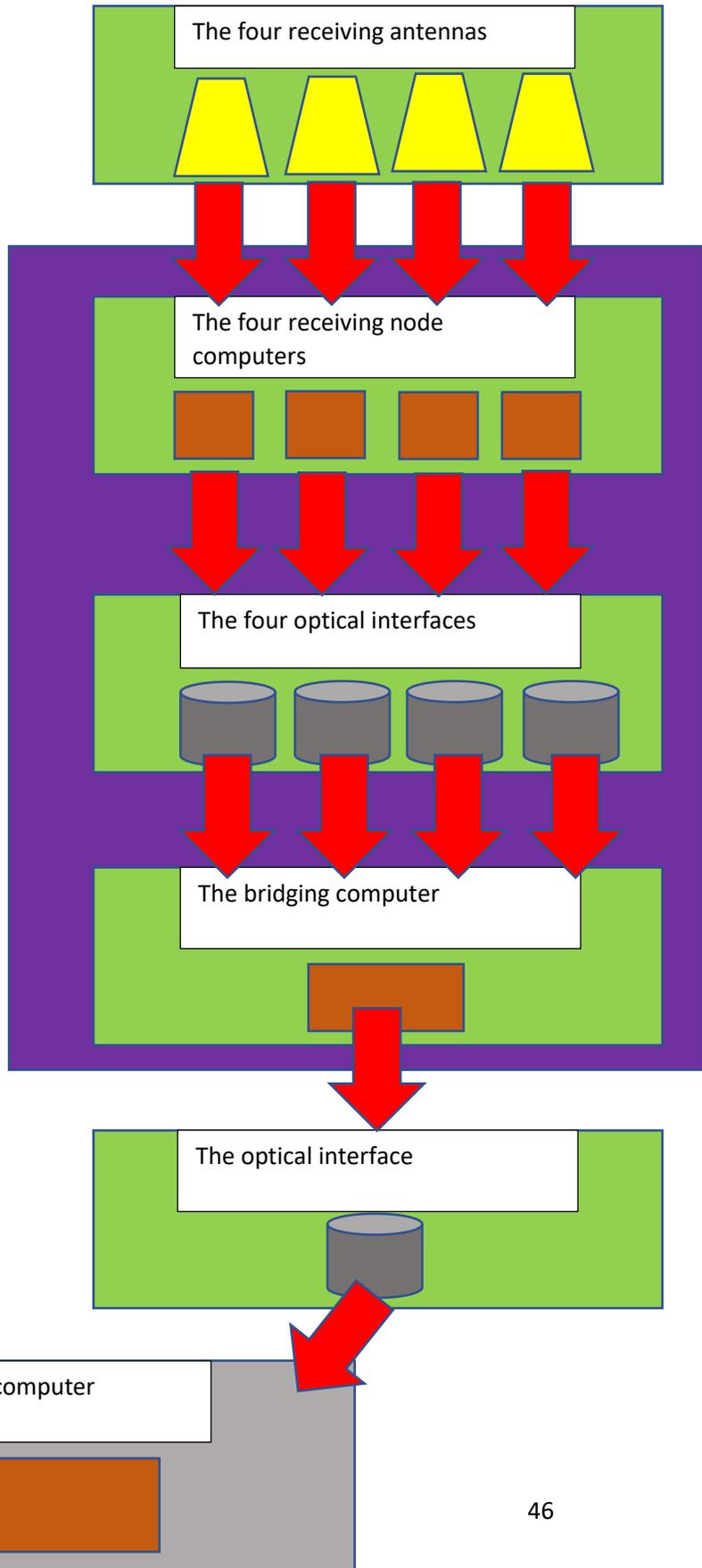
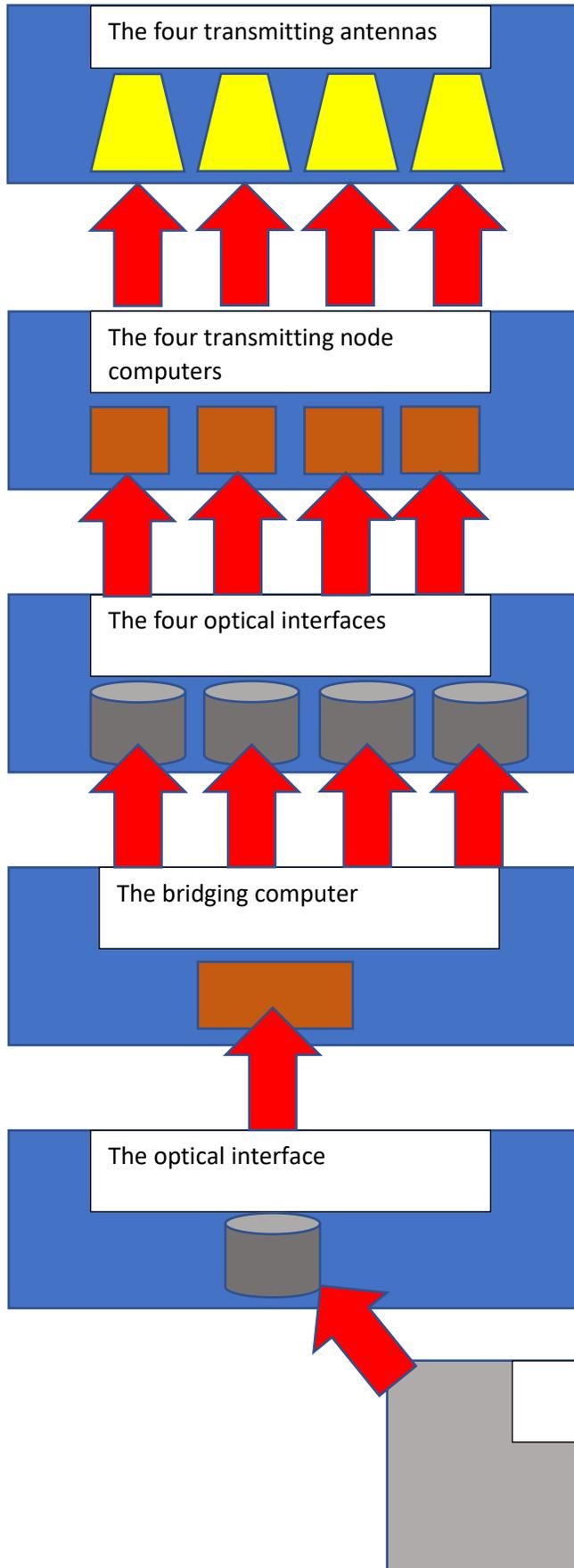
The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.



**Mechanism seven:**

The four receiving node computers will transfer the four streams of information received from the four antennas to the receiving bridging computer. the transfer of information is performed via the four optical interfaces.

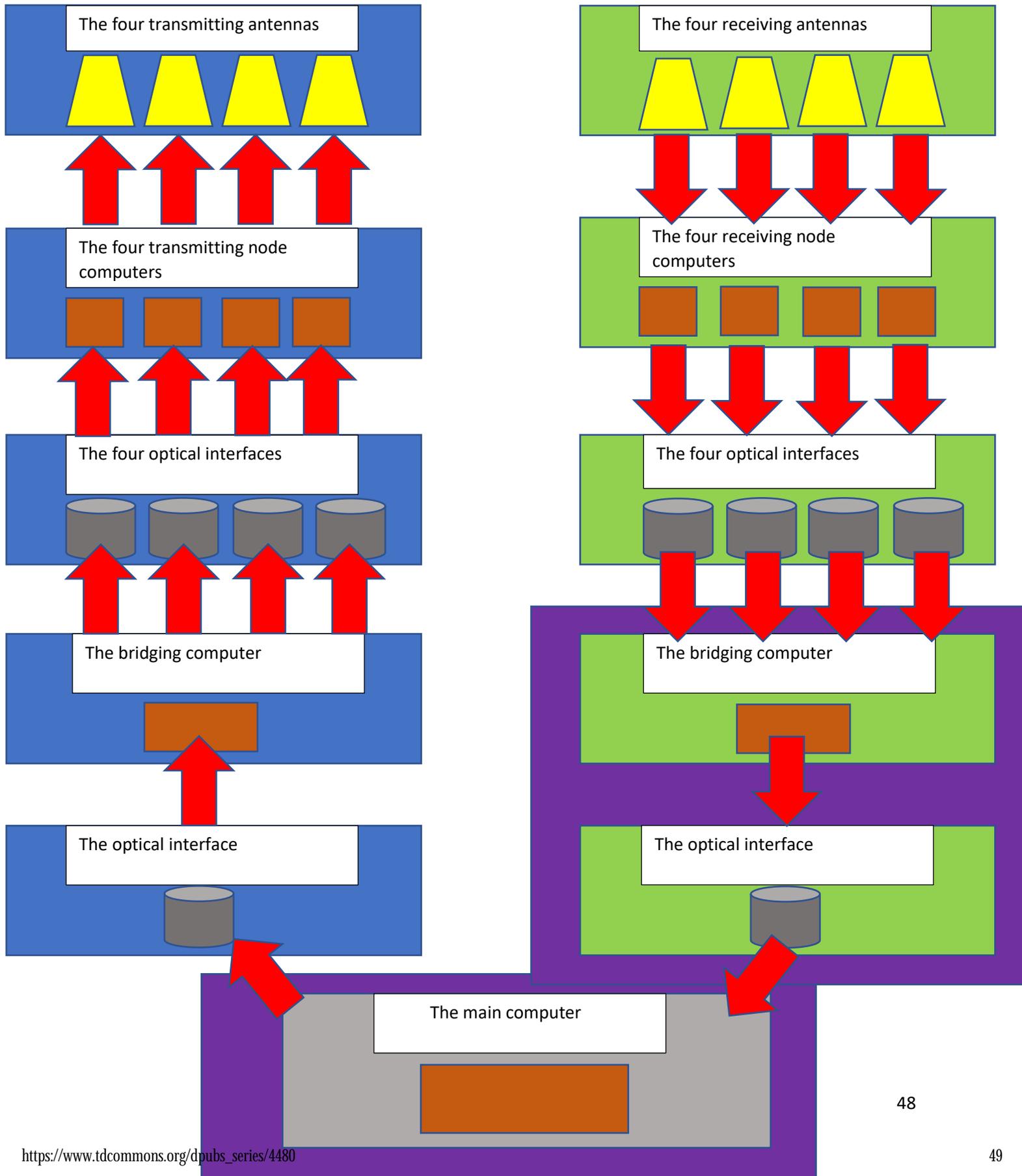
The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.



### Mechanism eight:

The receiving bridging computer upon receiving the four information streams from the receiving node computers, will transfer the four information streams to main information processing computer via the optical interface.

The entities that are involved in this mechanism are highlighted in dark purple color in the diagram below.



Mechanism nine:

The information processing main computer of the structure B will analyze the four information streams received. Through the analysis process the main computer decodes the information according to their states exhibited during transmission as radio waves. That is the entire stream of four state information units that was transmitted by the structure A.

- The general information transfer procedure for variation two is described below. The information transfer happens between the structure A and the structure B. structure A will transmit the information as a stream of bits and the structure B will receive the information as a stream of bits.

The general information transfer procedure for variation two is the same as for the variation one except for a distinguishable feature. The distinguishable feature is that instead of transmitting through only one antenna at a time, any combination of the four antennas can transmit radio signals simultaneously. The information transmission in the form of highly directional radio waves will propagate through the enclosing channels without interfering with each other. Due to the fact that any combination of the four antennas could transmit information at the same time, there will be sixteen different states in this variation. That is each information unit of transmission in a given instance of time will have one of sixteen states. Comparing the two variations, the second variation have the capability to transfer more information.

- Both of the information exchanging structures in this method in fact can simultaneously transmit and receive information in the form of highly directional radio waves. This is because each of the two structures have both separate transmission and receiving antenna units.