**ER Diagram:**

**Licensee**

| PK | licensee_id |
|----|-------------|
| | name |
| | email |
| | street_address |
| | city |
| | state |

owns

**Path**

| PK | unique_system_identifier |
|----|--------------------------|
| | transmit_location |
| | receiver_location |
| | transmit_antenna |
| | receiver_antenna |
| | path_type_desc |

path endpoints

**Location**

| PK | location_number |
|----|-----------------|
| | location_address |
| | location_city |
| | location_county |
| | location_state |

specifies

endpoint antenna

**Antenna**

| PK | antenna number |
|----|----------------|
| | antenna_type_code |
| | frequency_assigned |

**Coordinate**

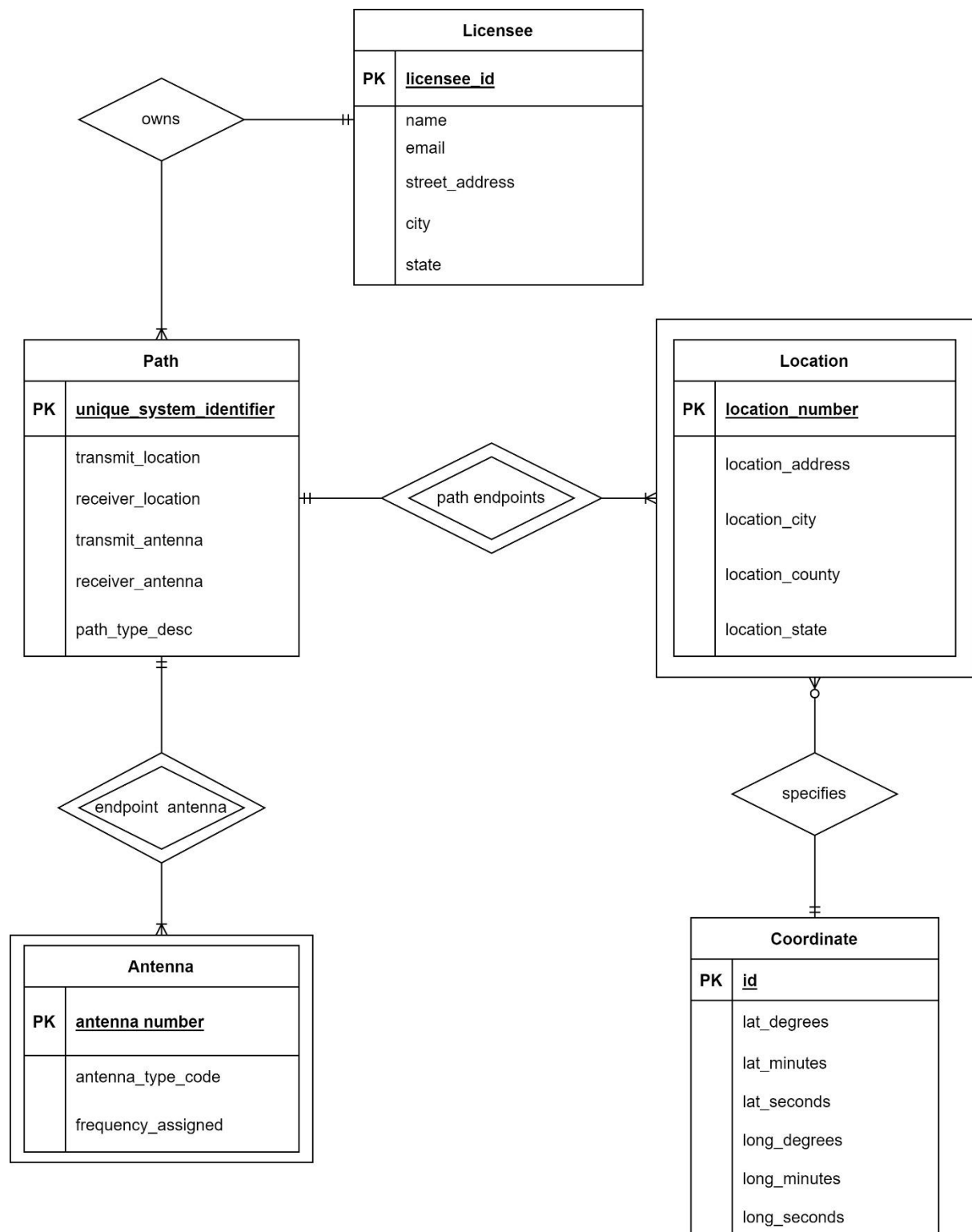| PK | id |
|----|-----|
| | lat_degrees |
| | lat_minutes |
| | lat_seconds |
| | long_degrees |
| | long_minutes |
| | long_seconds |

**ER Diagram Description:**

A path represents a radio communications path with references to both the transmit and receiver locations and antennas. There is also a path_type_desc attribute that tells the type of path. A path can be uniquely identified using its unique_system_identifier. This identifier is used by the FCC to uniquely identify each license. A path has at most two associated locations, and at most two associated antennas.

A licensee represents an entity that holds a license. The licensee is identified by their licensee_id and has attributes name, email, street_address, city, and state. A licensee can own multiple paths, and each path must have a single licensee associated with it.

The location table represents a location of transmission and/or a location of reception for a path. Each entry can be identified using the associated path and location number. It has attributes location_address location_city, location_county, and location_state.

The antenna represents the type of antenna and frequency for antennas used within a path. Each entry can be identified from its associated path and an antenna number. It has attributes antenna_type_code and frequency_assigned.

The coordinate uses a unique id to identify a set of latitude and longitude coordinates. For both latitude and longitude, we have attributes for degrees, minutes, and seconds. A location must be associated with a coordinate, and a coordinate can be associated with 0 or many locations.

**Relational Schema:**

Licensee(licensee_id:INT [PK], name:VARCHAR(100), email:VARCHAR(100), street_address:VARCHAR(255), city:VARCHAR(100), state:VARCHAR(20))

Path(unique_system_identifier:VARCHAR(10) [PK], transmit_location:VARCHAR(100), receiver_location:VARCHAR(100), transmit_antenna:VARCHAR(100), receiver_antenna:VARCHAR(100), path_type_desc:VARCHAR(255), licensee_id:INT [foreign key to Licensee.licensee_id])

Location(location_number:INT [PK], unique_system_identifier:VARCHAR(10) [foreign key to Path.unique_system_identifier][PK], location_address:VARCHAR(255), location_city:VARCHAR(100), location_county:VARCHAR(100), location_state:VARCHAR(100), coordinate_id:INT [foreign key to Coordinate.id])

Antenna(antenna_number:INT [PK], unique_system_identifier:VARCHAR(10) [foreign key to Path.unique_system_identifier][PK], antenna_type_code:VARCHAR(2), frequency_assigned:REAL)

Coordinate(id:INT [PK], lat_degrees:INT, lat_minutes:INT, lat_seconds:INT, long_degrees:INT, long_minutes:INT, long_seconds:INT])