AUTO MANAGEMENT INTERSECTION SYSTEM

Team Protocol Pros

AGENDA

- Introduction
- Solution
- Project Plan
- Sofware Requirement
- Design of the Project
- Timeline
- Summary
- Code Example

Total Slide: 15 slides
Estimate Time: 20 minutes

MEET OUR TEAM MEMBERS

Names	Roles
Ashutosh Mishra	Project Manager and Developer
Prakash Acharya	Technical Manager and Tester
Brendan Edgerley	Team Leader and Designer
Julian Villarreal	Researcher and Designer
Sarah Ryan	Technical Manager and Tester
Amado Lazo	Researcher and Project Manager
David Schelanko	Research and Developer

INTRODUCTION

PROBLEMS

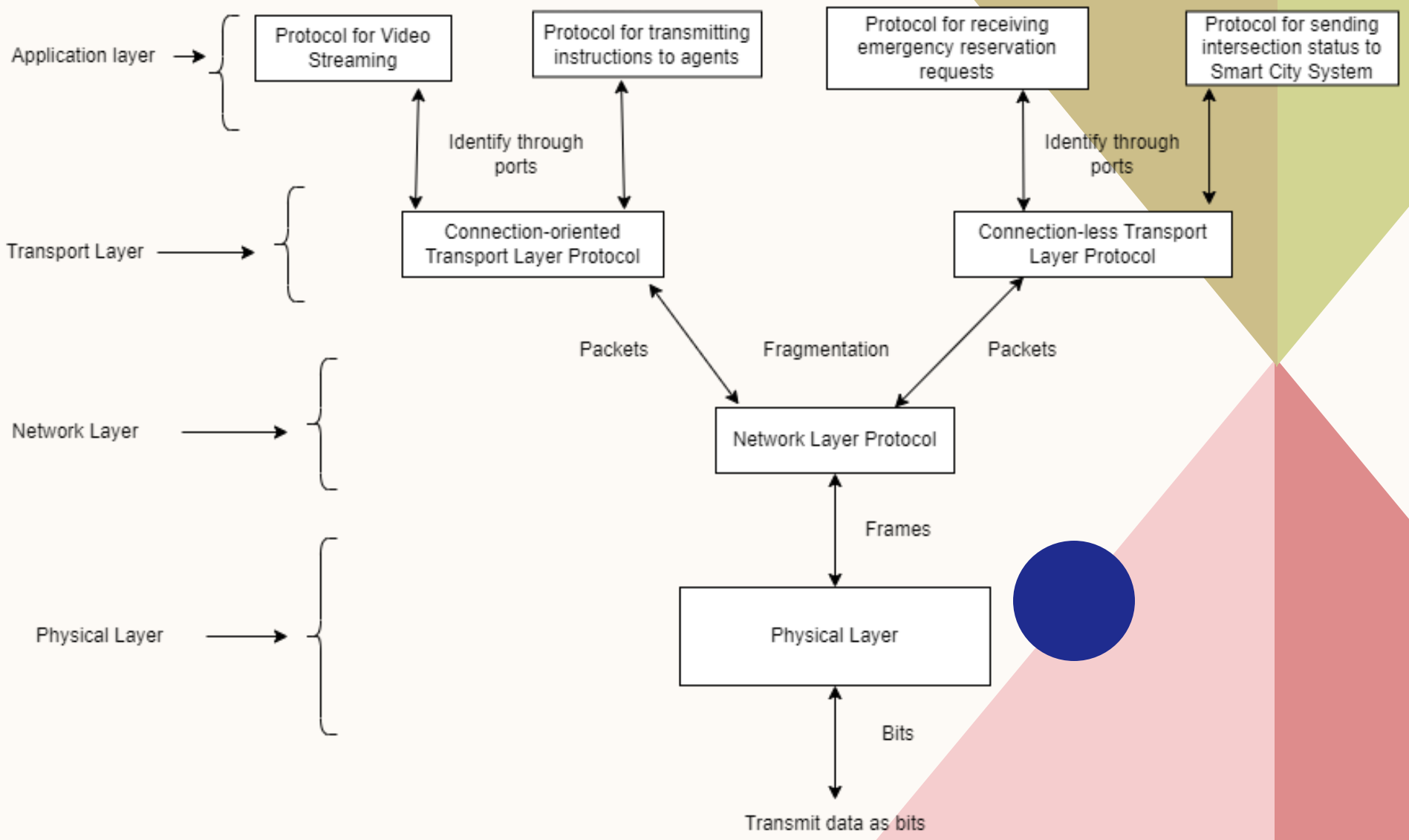
- Intersections are time-consuming.
- They are vulnerable to accidents.
- Huge potential to save time while considering security.

SOLUTION

implementing the **'protocol and network architecture'** for an ambiently intelligent, responsive, and sensible autonomous intersection management system

SOLUTION

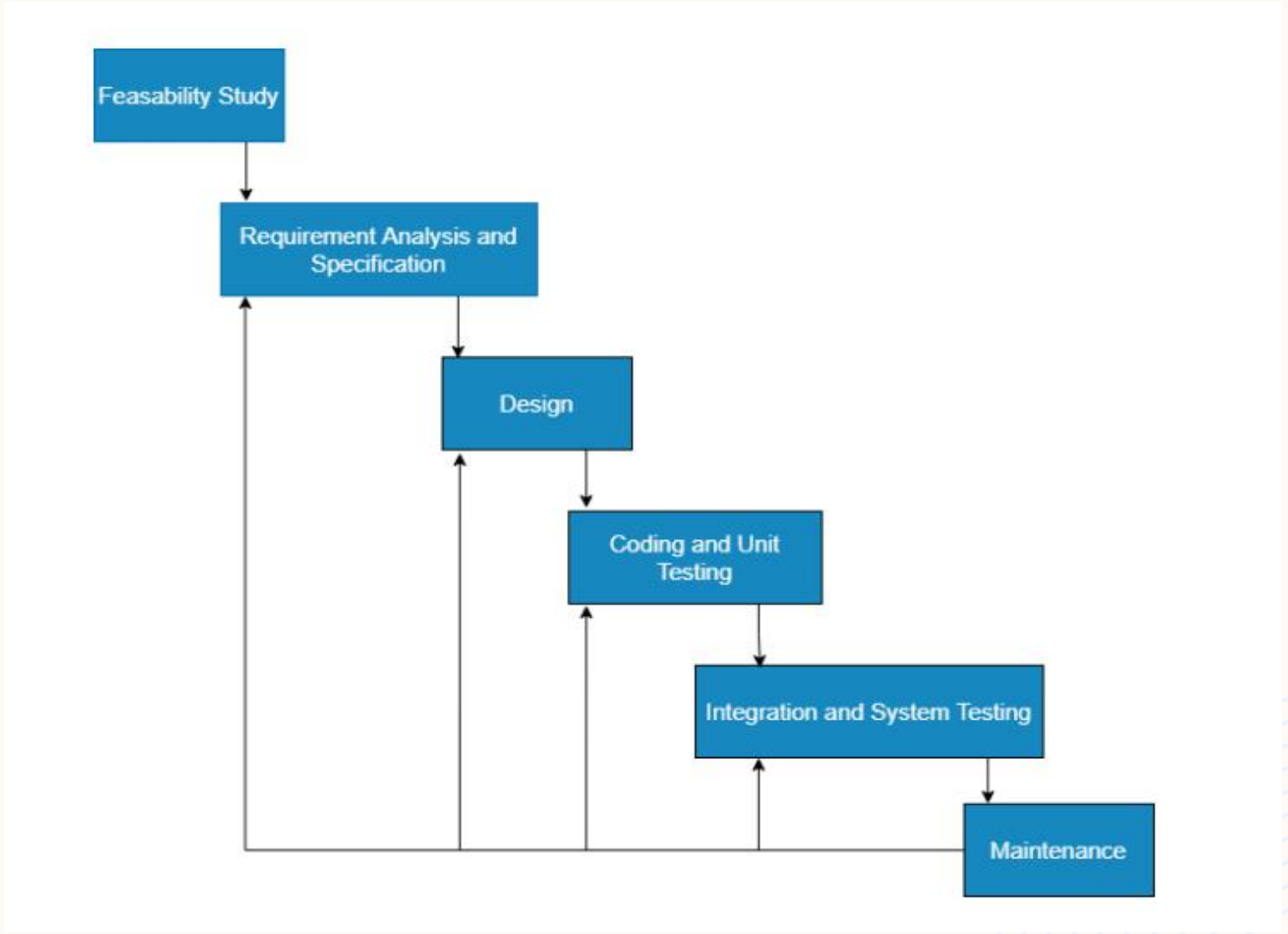
Basic Protocol Architecture of AIMS



PROJECT PLAN: MODEL

The iterative waterfall model was the optimal option for this structure of the project.

This model seems to be the most pertinent and effective to get the system developed.



TIMELINE

AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
• Create a Group	• Feasibility studies and Research	• Requirement Analysis • Design	• Coding and Unit Testing • Integration and System testing • Maintenace	• Complete Application and turn in all document

PROJECT PLAN: PHASES

FEASIBILITY STUDY

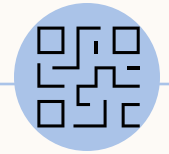
- Analyzing which features are viable to implement.

REQUIREMENT ANALYSIS AND SPECIFICATIONS

- Figure out requirements of the problem statement through overall analysis of the domain.

DESIGN

- Figure out proper design methodologies of implementing the solution based on requirements.



CODING AND UNIT TESTING

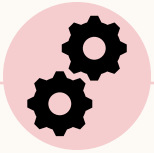
- Code and perform unit testing in the local environment.

INTEGRATION AND SYSTEM TESTING

- Perform testing against each of the available test cases

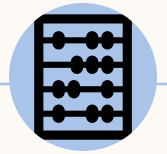
MAINTENANCE:
List out relevant test cases for the entire system. - Perform testing against each of the test cases available

PROJECT PLAN: TASKS



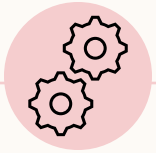
TASK 1:

- Setting up Video Streaming Protocols
- Setting up UDP based protocols



TASK 2:

- Integrate [re-trained OCR model
- Define the Hash Function for SHA-2 within HMAC authentication for Intersection-to-agent communication



TASK 3:

- Setting up HMAC authentication
- Setting up connection-oriented protocol

TASK 4:

- Setting up SHA-2 logic for transmitting intersection status from AIMS to Smart City system

TASK 5:

- Setting up Protocol for intercommunication between AIMS and Smart City System
- Develop algorithm for prioritizing emergency vehicles

PROJECT REQUIREMENT

FUNCTIONAL REQUIREMENTS

- Receive the video stream from intersections, through the defined protocol.
- Identify agents from the video, categorize the identified agents and analyze their behavior.
- Setup priority policy of agents prior to the intersection operation.

NON-FUNCTIONAL REQUIREMENTS

Hardware Requirements:

- RAM : 4GB (minimum) - Processor : Intel Core i5 (or equivalent, or above)
- Hard Disk : 50GB (in the main server) - OS : Windows 10 (or equivalent, or above)
- High-speed internet : 100mbps (including high-quality video streaming requirement) across single intersection for one video recording device

DOMAIN REQUIREMENTS

- Ability to record video of the provided intersection.
- A clear license plate on every vehicle passing through the intersection.
- Roads having clear lane-division, proper sign in roads for vehicles passing through the intersection.
- Ability to send instructions to every agent through cloud, with optimal latency such that the vehicles can pass exactly the same way as in the simulation.

The Use Case diagram is shown below. This diagram serves to represent the interaction of entities within AIMS and the different use cases.

DESIGN & DIAGRAM

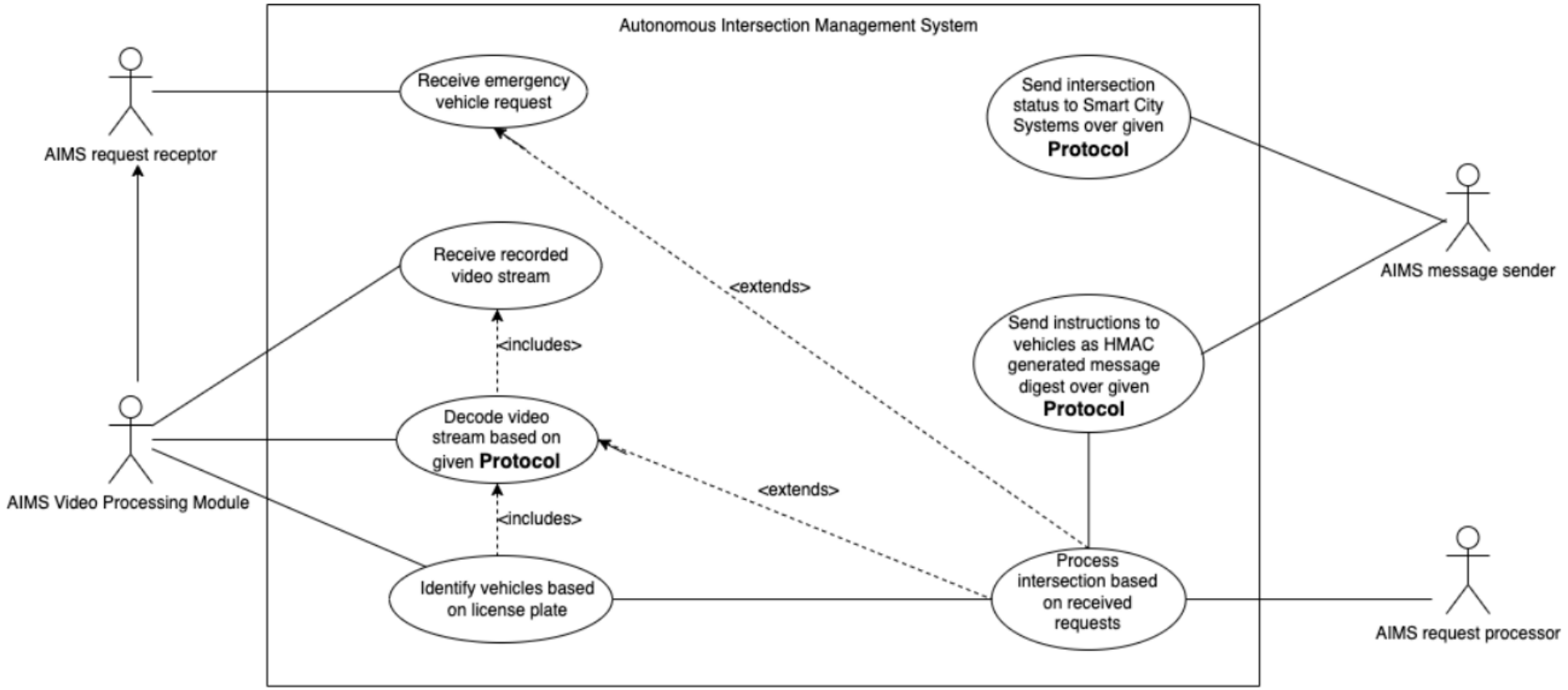


Fig 1: Use case diagram for AIMS

DESIGN & DIAGRAM

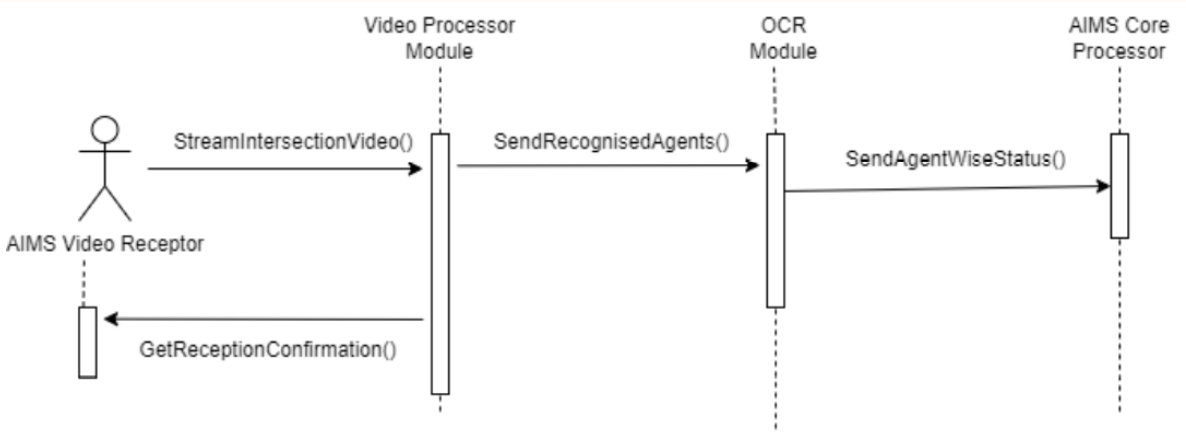


Fig 3: Sequence diagram for **Video-Receptor**

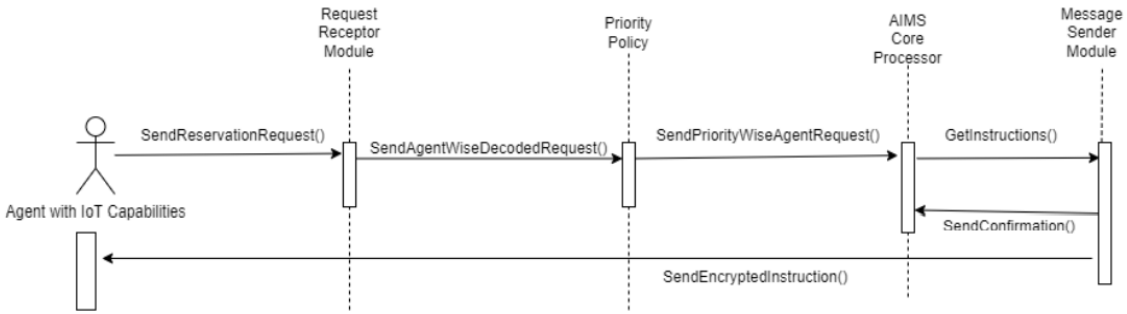


Fig 4: Sequence diagram for **Agents with IoT Capabilities**

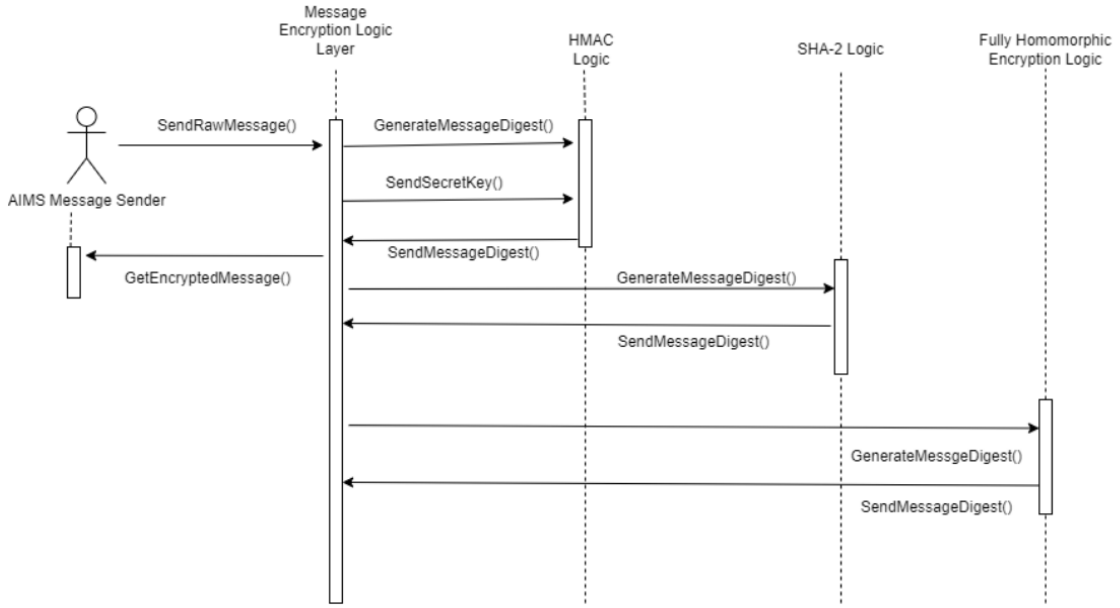


Fig 5: Sequence diagram for **AIMS Message Sender Module**

Tentative Sequence Diagrams covering 3 major modules of the AIMS system.

IMPLEMENTATION:

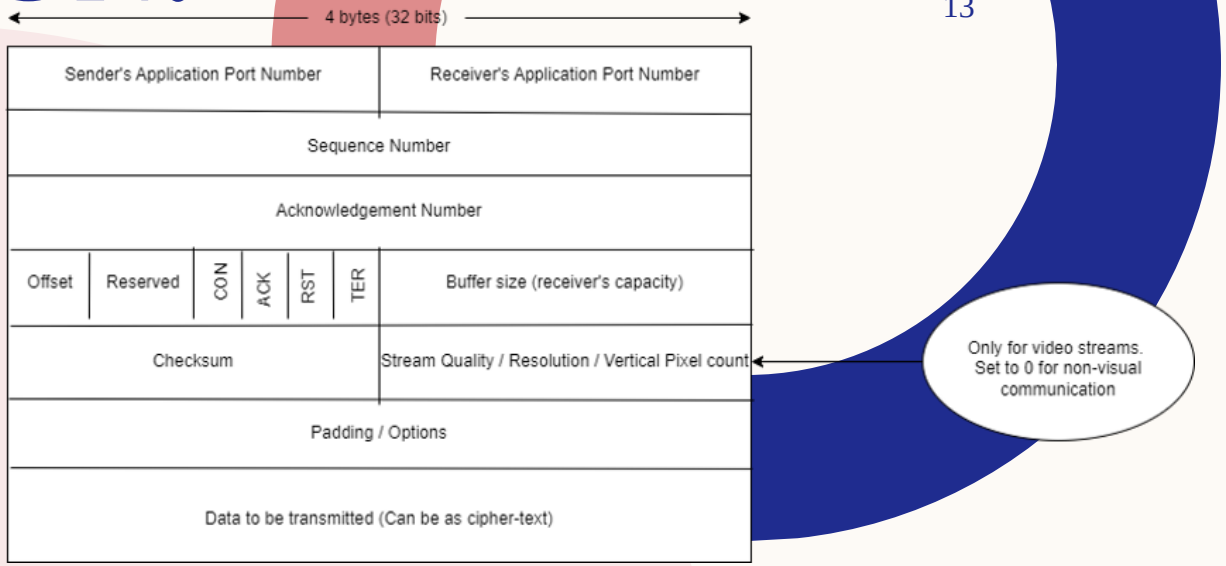
Video Streaming Protocol Request Packet Format

8 bits	4 bits	128 bits	64 bits	3 bits
Command	VSP (Protocol Name) / Version	Destination IP address / Domain Name	Stream Identifier	Video Resolution

Video Streaming Protocol Response Packet Format for any command(General)

4 bits	16 bits	4 bits
VSP (Protocol Name) / Version	Stream Identifier	HTTP Response Code

Video Stream Protocol



Transport Layer (Connection-oriented

8 bits	8 bits	16 bits
Protocol Version	Recipient Username	Recipient Terminal Name
HMAC Code	Sender Username	Sender Terminal Name
Transport layer protocol	Message priority	Cookie
Message		

Message Sending Protocol

SUMMARY

- The main purpose of this project is to comprehend the possibilities of an intersection, and accordingly analyze, research, develop and execute a networking protocol for autonomous intersection management system.
- This networking protocol will involve transmission of signals and critical information between entities involved in the system and enable assistance to the agents for deciding their trajectory based on the road conditions.

THANK YOU

Any Question or
Feedback??