Research On Implanting Wireless Computer Networking Strategies In A Derived IEEE 802.11 Standards In The Future Exploration Mars Robot Rover In Part Of 2020 Mission Of NASA To Have Data Communication And Information Retrieval In Martian Planet(Mars)

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***Abstract*-In this research paper we describe about the future mission of NASA in exciting robots for research purpose in the Martian planet commonly termed as 2020 mission of NASA.Here let us discuss about the assumed new version of OSI layer there to be discussed with the new methodology,in which it tells about the new way of data transfer as well as the extraction of processed data or information among the robots which share some equidistant apart.Here we discuss about the equidistant robots in the martian planet acts as a network node each communicates with respect to that of IEEE standards such as WiFi,Zigbee,etc…But while considering the electromagnetc waves based on the gravity of the new Martian planet assumed that some data bits could be lost or due to the catastrophic effects such as Martan dust-storms.So to overcome that security measures as well as error reduction technique such as CRC could be used with SSL-64 bit encryption as all satisfies expected outcome for robot communication is established in a secure and error reduced way**

***Keywords:*NASA ,Data transfer,WiFi,Modified OSI**

I.INTRODUCTION

This paper discusses the basic architecture that is needed to support the Mars Communications Network part of NASA's Space Science Enterprise (SSE) communications architecture. The network may use various networking technologies in wired/wireless such as those employed in the terrestrial Internet or remote active servers, as well as special purpose deep-space protocols to move data and commands the instructions autonomously between mars rovers at disparate Mars vicinity sites (on the surface or in near-Mars space) and between Mars earthbound users. The trend towards increasingly autonomous operation of the mars rover is aimed at reducing the dependence on resource scheduling and it should strictly done against catastrophic effects provided by Earth-based operators and increasing system fault tolerance. This paper will describe a number of the critical technology such as data transfer needs and some of the ongoing research activities for 2020 mars mission by NASA with robots.In the modern world, computing become basic necessity to the human, as computing became very popular, or in some cases in mars it is essential to have artificial intelligence the necessity of information sharing became very important, and additionally info security needed for it. The securing the communication channel is also in the part of info security and the security is done by wireless standard of IEEE 802.11 a,b,c, due to inherent broadcast nature of wireless channel, it is vulnerable to attack more than the wired channel relectantly because of unfortunate level of E-M

fields. Securing the wireless communication is increased dramatically. Most of them rely on encryption of SSL-128 bits mechanism for the security over rovers in data, more recently there has been interest in physical layer security techniques that exploit the characteristics of wireless channels and systems.In this, we propose a scheme that provides physical layer security by combining three techniques known as encryption and channel pre-compensation between the layers as well as channel error detection and error correction. The algorithm used for errored bit detection and correction is LMS Algorithm. Encryption transforms the original signal constellation into a higher order constellation or equivalent based on the key sequence generated by SSL-128 Channel pre-compensation is performed based on the of channel, which is location specific, at the transmitter. These two techniques distort the original signal constellation which can only be recovered by the intended receiver.And reduce the cost of adding physical layer security we resume the security architecture in new TCP/IP over IEEE 802.11 networks established over the mars rover Then we explain the impact of encryption mechanisms in a mobile node of hexagon structure of mobile communication in a case scenario in which one rover has the radio frequency in the hexagonal honey bee acts as base station. We propose a solution that eliminates redundancy in the encryption of the data at different layers applying the Cross-Layer design, we analyze the architecture for exchanging security information between layers and, finally, we propose an
algorithm for security inter-layer of SSL-128 bit communication and a solution for Cross-Layer signaling between nodes.

II.MARS GLOBAL SURVEYOR

The current Mars Global Surveyor mission is representative of the state-of-the-practice in Mars-to-Earth telecommunications and also for intraplanetary telecommunications and utilizes direct links to Earth based on X-band microwave communication link technologies at data rates up to approximately 90 kbps. Clearly, new technologies will need to be brought to bear to achieve this increased capacity and to support the new networking. These architectural elements for the Mars network are defined below:

A. Mars-Earth backbone network – This architectural element provides the long haul data links directly between Mars vehicles and the Earth based satellite as well as the Earth-based infrastructure elements. The remote assets include elements with long-haul capabilities (certain Mars surface vehicles,
spacecraft in Mars orbit) and the in-space/off-space data relay network. The Earth-ground segments include the deep space network (DSN), NASA and other space agency Intranets and virtual private networks (VPN's), and the Internet..

B. Mars vehicle proximity networks – These involve the wireless links with distances that are relatively or appropriately near to the planet. There are three types of proximity links.

1. *Orbiter to/from Surface (called access network in):* This architectural element provides the data links between Mars surface/airborne vehicles and robot rover node in Mars orbit. The orbiters will typically contain the long haul links to Earth and will host a gateway to the backbone network and paves way for the new layer technique to relay between the backbone elements and the mission spacecraft and/or vehicles

2. *Mars inter-spacecraft networks* - This architectural element provides the data link between satellite node in the orbit in formation, clusters, or constellations in the Mars reign. It also includes the communication interfaces between approaching/departing satellite node.

3. *Mars surface networks (secondary/new layer network):* This architectural element provides the data links between surface vehicles (rovers, jets, aerobots, marslanders, and sensors) spread out in an ad hoc network.

C. *Local area networks* (LAN's) on-board the Mars vehicles (included in the access network [1]): This architectural element interconnects the various modules of the mars rovers(but it is not necessary while for the wireless standards)through an internal LAN consisting of one or more types of serial or parallel interconnected busses.

Where possible, Internet protocol (IP)- compliant services can be used to enable the use of powerful Internet-like applications (ftp, e-mail) application program interfaces (sockets), and derived languages (derivedJava, Java Script, derivedHTML, XML, etc.) that simplify the task of coding operations that move data and command and coordinate activities between

Mars vehicles and also to Earth based satellites Many Mars vehicles will implement on-board, Local Area Networks (LAN's) to route data and commands between subsystems and science instruments and it is always regretted as because the smart way paves the way for wireless standard. Standards are emerging that define common interfaces for the on-board and also for (new derived/new semi-conductor based board available in the Martian Planet) communication needs. Integration with the general Mars communication architecture through common protocols also with routing that provide standard naming and addressing schemes will makes for challenging and simplified access to resources (e.g., instruments) by users and other vehicles.

PROPOSED LAYER OF OSI LAYER FOR MARS

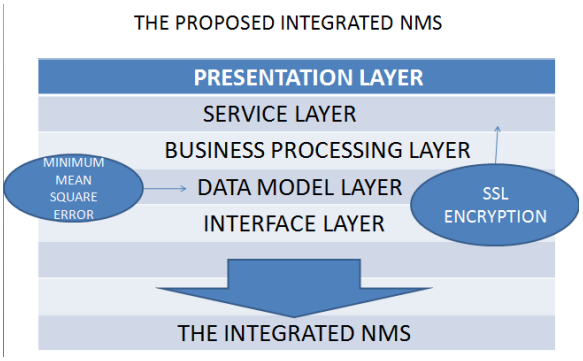

Fig1 New Derived OSI standards for Martian Planet

Interfaces between integrated NMS and specialized NMS.

Data model layer implements the Unified Modeling of NMS data and GIS data.Here the MMSE/LMS algorithm is considered for the error reduction of data bits while transmitting among the robot rovers or to the earth station. Business processing layer implements the business logic functions, such as system security management and mainly security and we recommend SSL-128 , service scheduling, etc .. Service layer provides services for the calling of client side i.e from the rover to another/base station of the orbit to be transmitted to the earth station/NASA. Presentation layer presents Geographic Information Locator, information aggregation and real-time information presentation extracted from the data sent/retrieval for the NMS using presentation technology, including GIS visualization technology.

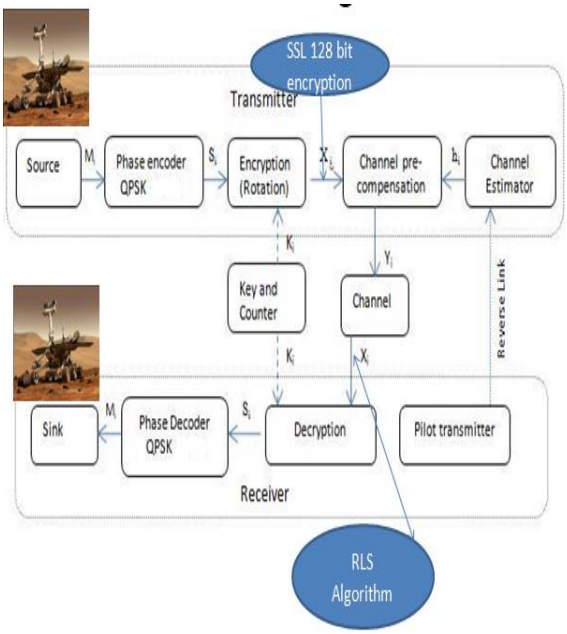

Fig 2.Block diagram of transmission/reception b/w rover

Quadrature Phase Shift Keying, is another form of Angle modulated or which based on the gravity i.e (1/3)rd of the earth found a change in , constant-amplitude digital modulation. We have chosen 8 bits of keys sequence per symbol to encrypt the constellation hence we get 256 symbols spaced 256/2π+n (where n represents weighted array that should be resolved at th receiver side to get the errorless information by considering the frequent catastrophic effects which has been got by nasa.gov)apart. Higher key size can be selected from key-sequence, resulting in higher constellation size, to enhance the security without affecting the performance of the main channel.

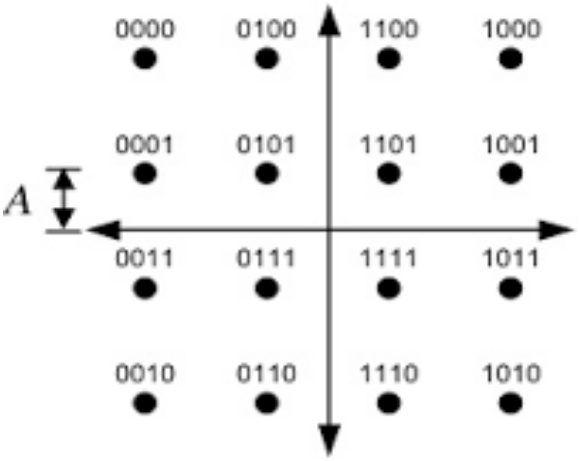

Fig 3 Quadrant for the separation/allocation of secured bits

Fig 4ACTUAL GLOBAL IEEE 802.11

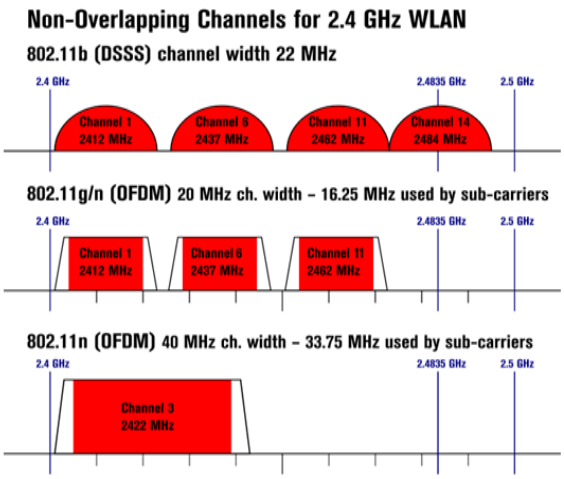

Fig 5.Bandwidth allocation (actual)

III.CONSIDERABLE DE-MERITS

In mars according to space data the velocity of light =(1/3)(3*10^8).So the frequency must be larger. Also in this point of view there must be a promising probability of data at higher frequencies can be available in terms of IEEE 802.11.So in 5G there have the two rovers in MARS and there must also be the error induction because of change of E-M fields.The separate channel which indicates the bandwidth allocation and it is non overlapping among the rovers signal.It shares the previous generation technique of OFDM(Orthogonal Frequency Division Multiplexing).Based on the antenna design there comes the bandwidth and high frequency range for uplink/downlink of data so that there will be elimination of ISI(Inter Symbol Interference)that is done by selection of selected substrate of rectangular patch array

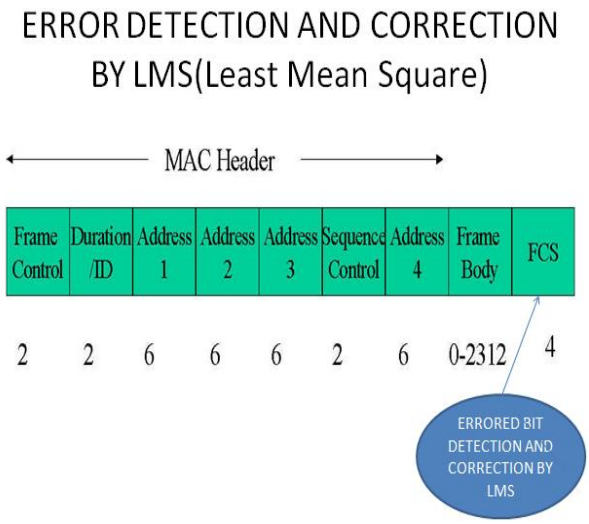

Fig6 Frame format of TCP among rover with CRC

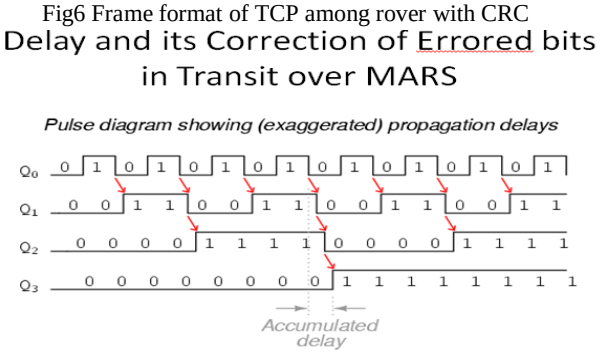

Fig 7. DerivedTransmission of bits (delayed version)

Transmission of data bits and delay caused/loss of data bits due to delay/catastrophic effects,so that pulses are taken accordingly and we supposed to delay one bit/transmission by consideration of gravity,velocity of light or other physical factors and it should be discussed as information is transferred sequenced.

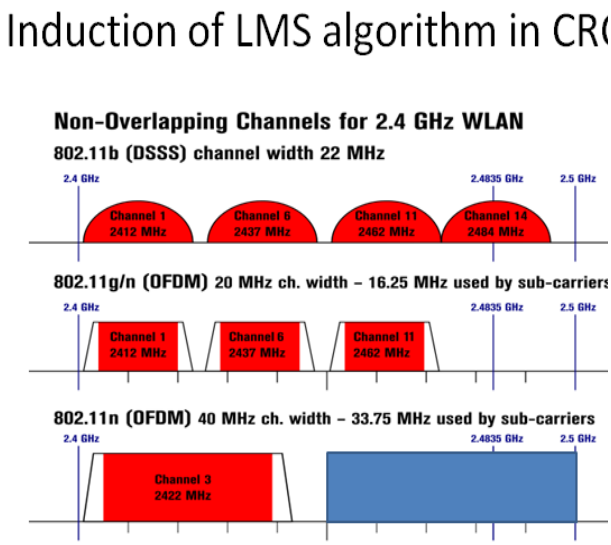

Fig 8 Derived bandwith availability(as of LMS/MMSEE)

We have designed a Cross-Layer algorithm especially for Mars that allows the exchange of information of the layer encryption mechanisms used among the non adjacent layers in order to reduce the amount of encrypted data in the local layer. We have proposed changes in TCP protocol, with a new option at TCP header, to signaling the application of the Cross-Layer solution to solve multiple encryption. secure wireless communication Scheme for securing the entire data burst by using combination of conventional cryptography and CSI to provide security at the physical layer thus adding another level in the security of the wireless system. The encryption and decryption was found to have negligible effect on the performance of main channel. Fading is disadvantage for reliable communication but when it comes to security it is an advantage due to its location specific impulse response which is unique hence acts as a ciphering operation along with the conventional cryptography. Therefore the eavesdropper needs to know both the channel response of the main channel and the key-sequence to know the original constellation.Also because of channel precompensation there occurs a band gap for the information transmission/retrieval and it could be done as economic

IV.METHODOLOGIES FOR DERIVED NETWORKS

Technologies for the Mars rover networks named Oppurtunity(rover) need to focus on delivering higher data rates at very long distances and also address the transport layer protocols issues for such distances. The use of Ka/Ku band technologies will allow increase in high flow of error reduced data rates according to the antenna design in our previous paper currently achievable at X-band frequencies. In the long term various methods of employing optical communications will be the next step to increase the data rates. At the physical layer, the backbone technologies that are addresses increasing the emitted/radiated power output of Ka-band transmitters, improve the sensitivity of receivers, and handle higher rate digital bit-streams. These technologies include: 1) high efficiency amplifier Ku-band 90W and 160W traveling wave tube amplifiers (TWTA's), 2) ultra low noise/denoising cooled receivers, 3) high rate modem circuits and 4) micro-radian acquisition and tracking technologies. The network layer activities will focus on providing accurate error control through methods of Automatic Repeat Request (ARQ) tailored for the deep space links. In DSN(Deep-space network) store-and forward technologies that enable data routing by address (not by command) must provide the communication between the protocols used on the long haul backbone link and the final secondary link. In addition, a network management protocol also we add best routing and efficient OSPF(Open Shortest Path First) tailored for deep space, but similar to the Internet's derived Network Management Protocol (SNMP) will be required to configure and operate the rover from the omni-directional sides. The backbone network/derived network will most likely support a variety of protocol and for the routing of data bitss for the higher layers. The transport and application layers may utilize variants of derived Internet-based protocols (e.g., dTCP, dUDP, dFTP), near-Earth space protocols (e.g., SCPS-TP) or deep-space network protocols The trend is to use the protocols to

enable data and also for process of data such as voice/image or MP4 or moving images to be passed as a semantically among all the robots/rovers which could be done by high power RFid (such as a record in a file versus just a bit stream) to and between intermediate spacecraft en route to a science vehicle at the Mars end (in forward direction) or to Earth (in the return direction).Also the program conversions could be done in a new programming.

V.CRITERIA FOR PROLONGED NETWORKS

Mars rover vehicles may employ multiple RF sub systems. It gives high frequency transmission and radiates omni-directionally would be used for communication with relatively fast moving adjacent robot rovers and also, such as to all altitude orbiter, for read of physical information , video(MP4). This subsystem, perhaps UHF, may also be used for surface-to-surface/surface-orbit/orbit-earth/ground station proximity communications wherein a rover could coordinate its science data gathering with other nearby vehicle(s); and it could locate the other vehicle(s) using direction coupling and self-ranging capabilities built into that system.

VI.Martian network strategies of rover

Most of the inter-spacecraft proximity networks will be implemented in one server satellite systems that operate in a fashion, such as in constellations or in a meteoritic, formations, or clusters.. Way for this inter-spacecraft to that of robot rover communication may include coordination of relative axial alignment and positioning, distribution of computing/analyzing tasks, master-slave or peer-to-peer(P2P) cooperation, event timing and measurement triggering, implementing a general communications network. The physical layer technologies needed for the inter-spacecraft network elements are small volume, mass,velocity of light, Kepplers law and power RF receivers and transmitters that utilize the UHF, S-band,Ku-band X-band, and Ka-band frequency region. Microstrip Array development includes phased arrays and omni directional antennas. Optical communications devices will eventually take part in inter-spacecraft networks. Also at the physical layer, further RF/optical of selected/different legible substrate to digital interfaces and modem development are needed. At the intra rover-spacecraft network's data link and information retrieval network layers a peer-to-peer(P2P) communication scheme is most appropriate. Also, motion or the variation of position(Matitude/Manitude) respectively largely by predictable orbital mechanics or by planetary revelution may be incorporated in the link topology driven network adaptations. The derived transport and application layers for the inter-spacecraft networks will use technologies similar to those used in the remote Internet and for ab normal-time applications on Martian planet. Additional development will be needed to implement derived OSI employed for the martian planet network services to provide time synchronization and distributed computing coordination. In general, the routing of autonomous coordination of the all specified robot rover set will be accomplished at and above the intra-base station of mars network application layer, as in an agent-based architecture.

VII.MARTIAN PLANETARY NETWORKS

The Mars region proximity networks are those wireless networks that are used to intercommunicate between the various entities in the Mars environment of varying atmosphere with respect to gravity or on the Mars surface. These secondary links are of somewhat higher data rate (multi-gigabits per second) as based on our antenna than i links (multi-megabits per second) and use different technologies with selection of good error reduction . These networks are used to undertake actions between Mars landers, rovers, aerobots, airplanes, etc. The surface /secondary networks networks are also used to transmit data from adjacent emitters to nearby, more capable of extacting informations (such as intelligent landers or rovers) that can pass the data up the communications chain to Earth via their access network system. A tedious factors of factors make the martian environment unique with respect to the commercial and innovative applications and require additional research and development to realize these surface ad hoc networks for planetary exploration. The systems will need to be autonomous so that they can be automatically deployed with good embedded system and robust to faults imposed by the harsh and unexpected natural environment. Economicity is dependent on the mass and size, greatly limiting the

power transmission or power generation capability that can be included. This gives the need for -energy efficiency in the operational algorithms.. These networks need to adapt in order to extract out as much information as conditions permit; to send data even if the bits lost sensed because of Martian Dustorms that occurs frequently occur in the serverstream, or perhaps even retransmit data with errors as there might be another chance to retransmit or collect the data. Most scenarios will benefit from a backward feed os data of assets as to be necessary, i.e., to build on previous mission assets as new in situ assets are overlaid. These will make new over give length time periods in comparison to martian sol(MARS time). The surface primary network's data link layers may use a variation that is peer-to-multihop and modified for high power use or they may be modeled after wireless LAN's such as Bluetooth or IEEE 802.11 or all type of strategies, but with modifications. The protocols will accommodate network dynamics such as faults, ad hoc-style handoff for mobile nodes, and cluster-based network routing and management. Many other protocol issues specific to sensor networks are currently under investigation in the research community. Energy efficiency in the link and network layers is important as well as geographic routing and data aggregation.

VIII.TECHNOLOGIES FOR NEW STANDARDS(IEEE)

The various subsystems avionics related technologies of rover are also following the general trend of operating as a distributed system of autonomous but cooperating subsystems. The features/functions of the subsystems are increasingly implemented through software that is running on powerful processors embedded in the subsystems.. Depending on the rover multi complexity, there may be several types of local busses (e.g., IEEE 1357, Mil-Std 1553, Switched Ethernet of higher versions, SpaceWire) that could be involved in information transfer. Further complications are arising from translating between the various protocols that must be supported.

IX.CONCLUSIONS

The Mars communication architecture has been described for implementation and to be designed to be given to the NASA for exciting robots in 2020 mission in the near-, mid-, and far-term. These methodologies were based on innovative activities that are defining future Mars missions. The establishment of networks is a challenging with that of IEEE standards based on the nature of MARS and of varying E-M fields and it will be derived in our next phase and gave the derived and succeeded in new OSI layer with that of all derived layer that could be more useful for all type of data transmission/reception among robot rovers

X.REFERENCES

[1] Kul Bhasin, Jeffrey L. Hayden, Space Internet Architectures and Technologies for NASA Enterprises, 2001 IEEE Aerospace Conference, March 2001.

[2] Loren P. Clare, Jonathan R. Agre, Tsun-Yee Yan, Considerations on Communications Network Protocols in Deep Space, 2001 IEEE Aerospace Conference, March 2001.

[3] Internet Society IPN Special Interest Group, Inter Planetary Internet Study, http://ipn.jpl.nasa.gov/.

[4] High Rate Data Delivery, NASA TAP, http://hrdd.grc.nasa.gov