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STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

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• Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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INTERFERENCE EVADING USING SYMBIOTIC CODES FOR HIGH DENSITY WIRELESS NETWORKS

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ABSTRACT

The investigation of co-channel interference mitigation techniques such as interference cancellation through receiver processing, interference randomization by frequency hopping, and interference avoidance through resource usage restrictions imposed by frequency and power planning has become has become a key focus area in achieving dense spectrum reuse in next generation cellular systems. Collisions and hidden terminals are known problem in 802.11 networks. Measurements from a production WLAN show that 10% of the sender-receiver pairs experience severe packet loss due to collisions. Current 802.11 WLANS rely on carrier sense (CSMA) to limit collisions-i.e., senders sense the medium and abstain from transmission when the medium is busy. We propose the solution is to use the symbiotic code(SC) thus, enables successful simultaneous co-channel transmissions even if they result in a collisions. The performance of SC scales with the number of interfering links achieving median throughput improvements of 30 and 86 percent over time sharing with two and three interfering links respectively. We address fundamental challenges in realizing SC including synchronization, coding algorithms, extensions to different modulations. We also implement SC on software defined radios and demonstrate its practical feasibility High level, SC leverages properties of collisions in asymmetric interference scenarios, and codes transmissions to enable successful reception at the receiver.

KEYWORDS

symbiotic codes, wireless networks.

INTRODUCTION

WHAT IS MOBILE COMPUTING?

obile computing is a technology that allows transmission of data, via a computer, without having to be connected to a fixed physical link.

It is human–computer interaction by which a computers is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software.

Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

TYPES OF MOBILE SYSTEM

- Traditional distributed system
- Nomadic distributed system
- Adhoc distributed system

TRADITIONAL DISTRIBUTED SYSTEM

Traditional distributed systems consist of a collection of fixed hosts that are themselves attached to a network—if hosts are disconnected from the network this is considered to be abnormal whereas in a mobile system this is quite the norm.

These hosts are fixed and are usually very powerful machines with fast processors and large amount of memory.

The bandwidth in traditional systems is very high too. Furthermore, the execution context is said to be static as opposed to a dynamic context whereby host join and leave the network frequently.

In a traditional system, location rarely changes as well and hosts are much less likely to be added or deleted from the network. Ex- wired communication networks.

NOMADIC DISTRIBUTED SYSTEM:

This kind of system is composed of a set of mobile devices and a core infrastructure with fixed and wired nodes.

Mobile devices move from location to location, while maintaining a connection to the fixed network. There are problems that arise from such shifts in location. The mobile host has a home IP address and thus any packets sent to the mobile host will be delivered to the home network and not the foreign network where the mobile host is currently located. Such problem can be solved by forwarding packets to the foreign network with the help of Mobile IP.

Nevertheless, Mobile IP also suffers from efficiency (routing issues), Quos, security (authentication of mobile host at foreign network and end-to-end security required) and wireless access (reduced capacity) problems.

Ex- telephone communication networks.

AD-HOC MOBILE DISTRIBUTED SYSTEM

Ad-hoc distributed systems are possibly the only type of network that comes close to mobile networks in the sense that every node is literally mobile.

It is these networks that are very much seen as the systems of the future, whereby hosts are connected to the network through high-variable quality links (e.g.: from GPS to broadband connection) and executed in an extremely dynamic environment.

A-hoc systems do not have any fixed infrastructure which differs them both from traditional and nomadic distributed systems.

In fact, ad-hoc networks may come together as needed, not necessarily with any assistance from the existing (e.g.: Internet) infrastructure.

When nodes are detached from the fixed/mobile network they may evolve independently and groups of hosts opportunistically form "clusters" of mininetworks. The speed and ease of deployment make ad-hoc networks highly desirable.

These kinds of systems are extremely useful in conditions where the infrastructure is absent, impractical to establish or even expensive to build (e.g.: military applications, high terrain uses, and emergency relief operations).

WIRELESS NETWORKS IN COMPARISON TO FIXED NETWORKS:

- Higher loss-rates due to interference
- Emissions of, e.g., engines, lightning
- Restrictive regulations of frequencies
- Frequencies have to be coordinated, useful frequencies are almost all occupied
- Low transmission rates
- Local some Mbit/s, regional currently, e.g., 9.6kbit/s with GSM
- Higher delays, more jitter
- Connection setup time with GSM in the second range, several hundred

Milliseconds for other wireless systems, tens of seconds with Bluetooth

- Lower security, simpler active attacking
- Radio interface accessible for everyone, base station can be simulated,

Thus attracting calls from mobile phones

- Always shared medium
- secure access mechanisms important

TYPES OF MOBILE COMPUTING DEVICES

LAPTOP COMPLITER

A laptop computer is the most common type of mobile computer device. A laptop computer is a one-piece device (meaning the keyboard, screen and computer are all attached) that is small enough to fit into a person's lap.

Modern laptops range in price, size, and capabilities all though most laptops come equipped with DVD-ROM drives, wireless cards, and at least one gigabyte of RAM

Laptops are capable of handling any task normally carried about by a desktop computer, such as checking email, creating documents, or playing games.

NOTEBOOK COMPUTERS

Notebook computers function much like laptops. However, notebook computers do not come equipped with DVD-ROM drives, and have less memory and a smaller hard drive.

A notebook computer is smaller and sleeker then a laptop computer, but functionality is limited to basic computer programs and Internet browsing.

TABLET PC

A Tablet PC is similar to a laptop computer in that a Tablet PC often carries a wireless network card, and an adequate hard drive and memory.

Unlike the laptop computer, the Tablet PC does not fold open to reveal a separate keyboard and screen. Instead, the Tablet PC is a single screen and the consumer uses a stylus to write on the tablet in lieu of the traditional keyboard.

PERSONAL DIGITAL ASSISTANT

A Personal Digital Assistant (PDA) functions much like a laptop computer or Tablet PC but is a smaller, handheld device.

Original PDA devices were designed as an electronic address and date book holding contact information, calendars, and to-do lists.

MOBILE OPERATING SYSTEM

SYMBIAN OS

Symbian OS has become a standard operating system for smartphones and is licensed in the products of telephone headsets capable of processing data.

The Symbian OS was designed to meet the specific requirements of 2.5G and 3G mobile phones.

WINDOWS MOBILE

The Windows Mobile platform is available in a range of different devices, which come from several different wireless carriers, find the Windows Mobile software products from Dell, HP, Motorola, Palm and i-mate. devices operating under Windows Mobile are compatible with GSM or CDMA.

PALM OS

Since the introduction of the first Palm Pilot in 1995-1996, the veteran Palm OS platform has provided essential business tools to mobile devices, as well as the ability to access the Internet or a central corporate database via a wireless connection.

FIG. 1

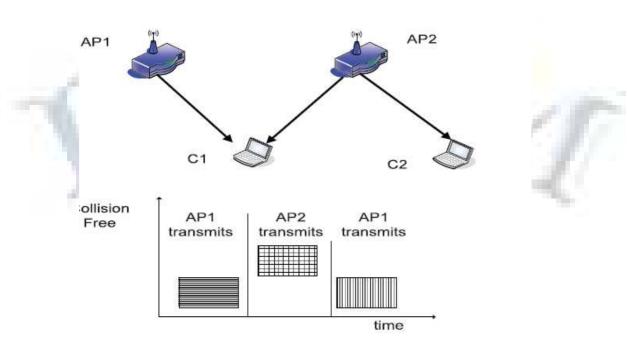
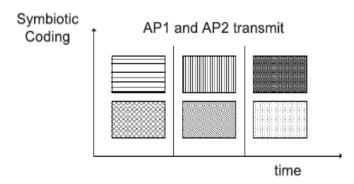


FIG. 2



ADVANTAGE

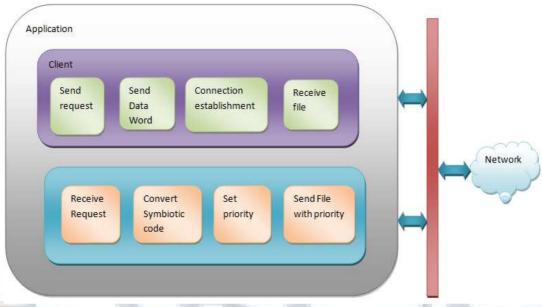
- Reducing transaction cost from one a/c to another
- Streamline business processes.
- Everything can be done through mobile internet
- Competitive pricing.
- · Reducing time to order for any products.
- · User friendly
- Low transmission power
- Robustness

BENEFITS OF MOBILE COMPUTING

- Reduced radio congestion
- Lighter dispatch workload
- Easier resource management and allocation
- Cost saving by avoiding news paper

SYSTEM ARCHITECTURE

FIG. 3



SYMBIOTIC CODE

SC is a topology aware coding technique that leverages asymmetric interference relations among links to among links to obtain capacity improvements compared to time sharing the wireless medium.

 $SC\ identifies\ harmful\ combinations\ from\ topologies\ and\ uses\ modified\ coding\ and\ decoding\ to\ avoid\ harmful\ combinations.$

Generally, for an N AP network, where di is the to be be conveyed to client j from its associated AP APj, SC refers to the use of an appropriate coding function Ei and decoding function Gi at the ith AP and client respectively, such that the following condition is satisfied at each client i:1

$$G_i(f_c(E_1(d_1,..,s_N),...,E_N(d_1,..,d_N)))$$

= $G_i(E_i(d_1,...,d_N)).$

It depends on the modulation. It may be represented as a binary Or function for the ASK modulation.

- A symbiotic code is a rule for converting a piece of information (for example, a word,a letter, a phrase, etc.,)into another-usually shortened or covert from or representation (one sign into another sign), not necessarily of the same type.
- In communications and information processing, encoding is the process by which information frim a source is coverted into symbols to be communicated.
- Decoding is the reverse process, converting these code symbols back into information understandable by a receiver.
- Variable-length codes are especiallyseful when clear text characters have different probabilities.
- A symbiotic code is usually as an algorithm which uniquely represents symbols from some source alphabet, by encoded strings, which may be in some other target alphabet

[1]

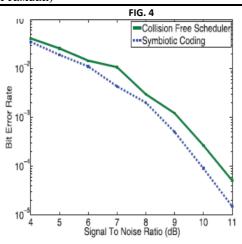


Fig. 17. BER improvement: SC outperforms time division scheduling. Strategic selection of transmitted symbols leads to received symbols spaced farther apart in the constellation than with individual transmissions.

FLOWCHART OF THE CODE GENERATION ALGORITHM

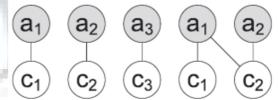
FIG. 5

Flowchart of the code generation algorithm.

Dataword	AP1	AP2
0000	000,001,010,011,	000,001,010,011, 100,101,110,111
0001	000,001,010,011, 100,101,110,111	000,001,010,011, 100,101,110,111
0010	000,001,010,011, 100,101,110,111	000,001,010,011 100,101,110,111
0011		000,001,010,011 100,101,110,111
0100		****
0101		
0110		****

FLOWCHART FOR CODE SCHEDULING ALGORITHM

FIG. 6



SYNCHRONIZATION

- Since we used a cable that carries the 100-MHz clock between two USRP2s, we measured that the transmit locks are synchronized to within a sample clock(i.e., 10 nano seconds)
- The computing power limitation aet the receiver prevents us from sampling at a granularity lower than 250 ns.
- Hence, we sample at 250 nanoseconds at the receiver and observe that the transmissions from AP1 and Ap2 are synchronized within this granularity.
- Thus, the synchronization ahieved is a small fraction of symbol duration of 1_s. Then AP2 to be perfectly coherent to within our sampling levels at C1(250 nanoseconds), thereby enabling Existing frequency.

PRACTICAL ENTERPRISE NETWORK BENEFITS

We explore the benefits that our solution provides to a large enterprise WLAN over and above any natural spatial reuse that can be exploited simply by scheduling.

I

We collect signal strength traces from a large enterprise network comprising around 30 APs distributed in the three 802.11g channels 1, 6, and 11, operating in the 2.4-GHz band.

FIG. 7

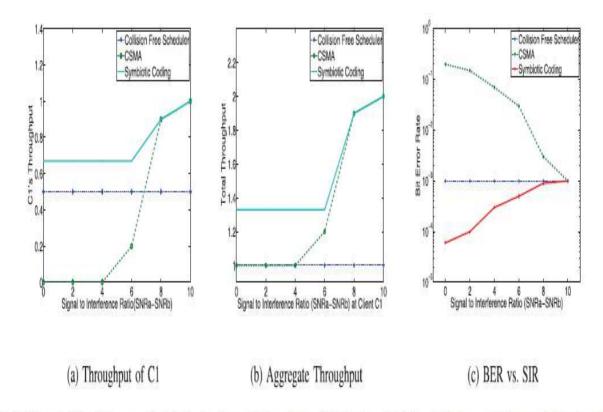


Fig. 18. SNR and SIR: SC converts interfering transmission from AP2 to beneficial transmission and demonstrates benefits with $SINR = SNR_{1} - SNR_{2}$

IMPLEMENTATION

After the careful analysis the system has been identified to have the following details.

- Encumber the assortment peers.
- Hurl the data word.
- Hooking launch.
- Electing Codeword Primacy
- Tidings handover.

ENCUMBER THE ASSORTMENT PEERS

- Encumber the active nodes in LAN. Once the correct destination router is found, an end-to-end peer connection (TCP or IP) is established to carry end-system.
- This connection remains active as long as the file requested transferred and it is dynamically shut down when not in use, permitting casual, any-to-any
 communication without the burden of specifying peer connections in advance.
- It also allows any-to-any routings dynamically shut down when not in use, permitting casual in large internetworks in which persistent TCP connections between every pair of routers would not be possible.

HURL THE DATA WORD

- A data word is a piece of information that determines the functional output of a transfer
- Without a data word, the algorithm would produce no useful result. In code scheduling algorithm, a Symbiotic Code specifies the particular transformation
 of data word into code. Code word as are also used to choose priority as well as to avoid hidden node problems and collision
- Code word is generated for eviding collision. In this module code word carried to hurl the file successfully

HOOKING LAUNCH

- The number of connections to establish between each pair of node in a network. Link is established between each and every node for communication. From the source node and intermediates node must have connection between combinations of multi node each and every node must be link to each other.
- In multipath data transmission, send the message from source node that means which type of file size and file extension

ELECTING CODEWORD PRIMACY

- The data word send by multiple clients will be forwarded to the server. The data word will be converted to the code word.
- This process is done by the main node. Among the three requested node the priority will be chosen by the server automatically based on the highest leading one's.
- If two nodes have same value of leading one's then the priority will be move on to the highest leading zero's.
- If this condition also fails then randomly three numbers will be chosen for priority settings.

TIDINGS HANDOVER

- The data word will be send to the main node as file request and the the tidings can be multiple requested node and code scheduling algorithms to avoid the collision.
- The sosurce node sends all type of file, and then enters the data word and destination node.

- Data sends from source node to destination node over the network. As well as data must be send from source node to intermediate node automatically source node to intermediate node automatically.
- Data send from source node to destination node in single path using wireless LAN. In this module the data's are successfully transfer from source to destination.

CONCLUSION

In this paper, we argue for joint modulation and coding across multiple links to improve the concurrency in high density Wireless LANs.

We propose a practical approach called SC that targets asymmetric interference scenarios and provides scalable capacity gains in high-density WLANs without requiring coordination among receivers .

SC that avoids the We address both the algorithmic and systems challenges. Our evaluation on software radios and using traces from real S in practice. Networks confirms significant benefit

Symbiotic Code, a receiver that can decode collisions. Our core contribution is a new form of interference cancellation that iteratively decodes strategically picked data word, exploiting asynchrony across successive collisions. We show via a prototype implementation

and test bed evaluation Symbiotic Code addresses the hidden terminal problem in WLANs, improving the throughput and loss rate. The Main node collects information about the data word by piggybacking code word information and priority on their own transmissions and promiscuously listening for transmissions from other nodes. Using the collected data, each node executes a Symbiotic Code that iteratively increases the number of concurrent transmissions that can take place.

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