SURVEY OF IMPROVED PERFORMANCE RADIO FREQUENCY CHANNELS IN WIRELESS COMMUNICATION SYSTEMS

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ABSTRACT—

The purpose concerning that book is after supply an overview or summary concerning the critical meaning then standards on radio-frequency and wi-fi conversation system. It begin along summary concerning to the records over wireless communication in general, beyond the first radio-frequencies communications regulations in imitation of modern cell cellular radio systems. It since contribution together with the thought over radio suspense propagation, forms regarding wireless verbal exchange systems or technology, and a basic notion about cell cellular radio communications. It classify wireless communications in classes concerning related to the technology through tribe related principles together. It additionally introduces protection concepts for wireless communication systems between averages or gives an example about security troubles the use of the Wi-Fi local area network. Finally, that opinions the contemporary Wi-Fi applied sciences as much well namely emerging technologies.

Keywords: cellular system, emerge technologies, multipath channel, propagations, radio frequencies, community security.

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1. INTRODUCTION

Radio-frequency wi-fi communications structures around because of much year with purposes rang beside garage-door opener in accordance with source of trouble communication [1]. The applied sciences cowl a huge spread about functions oriented towards different usage then needs. These applied sciences have advancing at unparalleled rate, or theirs impact is explicit between our day by day lives. Less wiring potential increased pliancy then affectivity or decreased wiring costs. In dense parts over the world, wireless communication is the fastest growing region on the verbal exchange industry, imparting a treasured supplement or choice in conformity with existing wire network [2].

Based on quantity of users regarding wireless conversation products yet subscribers in imitation of service, such is at last desired technique about communication [3]. Many systems formerly born on the wire are in modern times born over wi-fi media. The surprise godsend of mobile cell radio then lousy wireless technological know-how has basically changed the way humans speak then lead. The wireless revolutions according to the recent multibillion dollar wi-fi communication industries. Link employment area, wi-fi conversation has alter a pathway commercial enterprise. As example, together with a PC computer, a wireless modem, and mobile phone, a commercial enterprise guide may touch his and her workplace or consumers then government enterprise whilst traveling. Field service sales rank be able access company databases in conformity with take a look to inventory status, price or shipping quotes, modify schedule activities, and fulfill orders without delay in imitation of the factory whilst traveling. Company rank be able utilizes two-way paging applications in accordance with remain between shut contact, also so common wired conversation features is available [4].

For instance, wi-fi native vicinity network (WLAN) units permit customers to move theirs laptops beside area in conformity with region inside their office environment except the need because wires or without dropping community connectivity. Ad hoc networks, certain as much these enabled by using Bluetooth, enable information synchronization including community structures then services distribution within devices [5]. Bluetooth be able also cast off cables for scribe then vile peripheral device connections.

Handheld devices, certain namely private digital assistants (PDA) then cellphone phones, allow faraway users according to synchronize private databases, and they provide access in conformity with network functions such namely wireless e-mail, Web browsing, then Internet access. Moreover, it applied sciences provide amazing virtue savings and brought purposes to numerous purposes ranging from the retail setting after the technical save ground in conformity with advance responders. Risk is a typically associated together with wireless communications technology, because the airwaves perform stand accessed via intruders. Potential hazards include deprivation of confidentiality, breach regarding integrity, ruin concerning resource availability, yet break concerning proprietary information, according to point out solely a few [6]. Malicious users may attain get admission in accordance with a community and deliberately unfair a facts by means of spreading viruses, then it may sincerely launch assaults as prevent licensed users from gaining access to the network. Even postulate records confidentiality or probity is no longer compromised, unauthorized customers might also thieve bandwidth or motive a minimize within network overall performance then uses a inclined wireless network namely a board because of launching a network assault of a 0.33 party. These gambles are now not strange in imitation of wi-fi systems, but the dangers are exacerbated by means of the makeup of wi-fi connectivity [7].

This book gives a brief regarding the problem regarding radio frequency (RF) and wireless communications and introduces the notion over security because wireless communications. lifetime This consists of a dialogue over the ordinary standards and definitions concerning RF-
based wireless communication, a number of forms and services concerning RF wireless communication, sum regarding radio worry propagation, the cellular verbal exchange systems, and a overall beginning concerning the security troubles between wireless communications among standard and WLAN within particular [8]. Also the prices over modern-day and rising wireless communication technologies. Of specific hobby the mobile radio system, who has become the near substantial RF wi-fi verbal exchange the system.

1.1. RF Wireless Communication
RF wireless verbal exchange commenced at the flip about the twentieth century, extra than one hundred years ago, then Marconi installed the preceding successful then sensible radio systems. Tested the transmission on radio alerts created the distance of about 2 km. He conducted additional experiments in the tradition of 1901, where his radio base transmitted transatlantic radio alerts outside England after Newfoundland, touching a distance of 1,700 miles Mobile History. Only telegraph code sent. On December 24, 1906, Reginald Fessenden performed the first radio exchange on the human address on a bar about 11 miles from Brant Rock, Massachusetts, by mimicking the Atlantic ships (date number) Restricted according to telegraph symbols; once was no longer just a Wi-Fi telegraph. He used to be a milestone highlighting the foundation on the age of sound [9].

In the last few years of RF wireless connectivity, radio broadcasting has been the most common wireless exchange technique. The process of creating a vacuum barrel after vacuum triode created progress within the radio transmission via the loop signals. The broadcast was created by modifying the modulation (AM), then modulating the FM (modulation) later. The amplitude adjustment around the radio frequency was again imitated in the tradition of lifting up until the FM was delivered once in the late 1930s. After the Foreign Secretary was delivered through Armstrong's robust durability, many wireless Wi-Fi systems, such as television, one-way radio and radar, were added between the late 1920s and the mid-1950s [10]. There was another teacher we were used to seeing in the 1970s, which is the openness about the increase in cellular radios and personal verbal exchange services. The first commercially viable mobile cellphone was verified in 1979. Currently, the exchange of Wi-Fi is verbal regarding all types of our society.

1.2. System Architecture
RF wi-fi conversation system, radio wave is ancient in conformity with switch data within a transmitter (Tx) then a receiver (Rx). RF systems can stand categorized much either terrestrial-based or space-based systems. Terrestrial-based systems encompass microwave point-to-point, WLANs, then mobile cell radio, in accordance with mention solely a few [11]. Terrestrial microwave systems are confined of association yet line-of-sight (LOS) manufacture is the limiting factor. Relay towers including diligently aligned directional antennas are repeatedly ancient in imitation of supply an unobstructed course above an extended distance. The facts sign is processed, up- yet down-converted, modulated yet demodulated, filtered, then amplified at the transceivers. The transmitted sign propagates through the flatulence then is attenuated by using countless creation mechanisms.

Space based system are comparable in accordance with worldly microwave structures except that signals journey from earth-based floor stations in accordance with a source of trouble (uplink), signal is sent back beside the satellite in imitation of some other earth-based floor condition (downlink). This achieves a ways wider coverage region than the earth-based systems. The satellite law may want to stay into geostationary base orbit, moderate floor orbit, then low earth orbit [12].
A traditional wi-fi verbal exchange rule is proven between configurations 1. It consists of the source on information, hardware subsystem known as the transmitter, the race yet potential with the aid of as the signal travels, some other hardware subsystem known as the receiver, yet a vacation spot concerning the data (the sink).

Figure 1: Simplifies model concerning terrestrial-based RF wireless conversation systems (7)

The supply elements the records to the transmitters within the form regarding audio, video, data, and mixture of the three. The Tx or Rx combination is chronic in accordance with vary the sign between a form suitable because transmission yet then in accordance with convert the sign lower back after its unique form. The RF birth race is age variant, consequently the utility regarding some rule may also range because regarding the results on atmospheric electrified activities (mostly photo voltaic ionization), weather, and lamely human-made uproar sources [13]. This time-variant channel requires careful deliberation among the layout concerning someone wireless communications system. In wireless communication, radio waves are back in accordance with switch information, then because radio waves produce among space, which are susceptible in imitation of incomplete security risks. An intruder do cut off the signal then gain get entry to in imitation of network services, except animal a licensed user. The unique hazard associated in imitation of wi-fi communication is introduced later.

2. RESEARCH METHOD

2.1. RADIO Wave Characteristics
When electric limit amongst the shape upstairs high-frequency voltage or cutting-edge is applied to an antenna, such is transformed of pursuance including electromagnetic (EM) waves since radio-frequency energy. At the Tx, the antenna converts a time-varying voltage yet modern-day among a time-varying propagating EM wave. The oncoming EM wave propagates of area outdoor past the supply (the antenna) at the career concerning mild along with the succeeding suspense surface altering amongst wideness so kind of the voltage or current changes among amplitude. Radio waves produce through house namely lots touring EM field proportional among pursuance of the time-varying voltage than current. The propagating RF electricity is straight upon related to an electric powered mortification yet a magnetic abstention component [16]. The couple fields show up collectively due to the fact an exchange into the electric area generates a like alternate concerning the magnetic field, but guilt versa. At the Rx, the antenna performs an adversarial action touching altering a time-varying propagating EM anxiousness within conformity together with a time-varying voltage and current. Polarization regarding the radio fear is imperative then is committed through the path about the electric
frugality. Usually, the constructing but orientations concerning the antenna decides the electric powered discipline components. The horizontally afterward vertically. The magnitude concerning the administration radiated inside the ground in regard to technology decide to remain deliberated so like the fantastic isotropic (independent in relation to direction) radiate limit (EIRP) and high characteristic radiated rule (ERP) [17]. This is the just radiated rule reachable oversea about a Tx between the ground over near achieve because 15 isotropic yet directional antennas, respectively. It is a measurement concerning the good respecting an antenna within directing the transmitter regimen within a particular direction.

2.2. Forms concerning Radio Waves
Radio waves generate of house in different forms. The traits of the propagating waves are of activity among deep wireless verbal exchange systems designs. Propagating radio waves do stand categorized as like prescribe (or broad space), ground (or surface), tropospheric, or ionosphere [18]. These sorts about waves are illustrated into formal 3.

Figure 2: Common sorts about radio waves among wireless verbal exchange systems.

Direct waves, of as technology is of broad area without someone obstruction, are the best form of radio waves. They are projected into an at once LOS amongst the Tx and Rx. The two-way radio, cellular telephone, and non-public conversation regulation at any place bear it type as regards radio wave. Ground waves are subdued afterward the decrease ecosystem then the flooring about the earth. A floor bud consists of as much quantity regarding the radio suspense besides prolong affected by road about United States and objects about the terrain [19]. It is guided alongside the floor on the earth, reflecting since scattering apart buildings, vegetation, hills, mountains, and vile irregularities concerning the earth’s surface. These waves reason structure beyond the antenna but endure refraction due within pursuance concerning model about the altitude touching the ecosystem. The signal electricity decreases so the association into the Tx but the Rx increases. They create within predominant house but may additionally answer within conformity regarding earth with the aid of reflation but scattering both within the troposphere and within the ionosphere [20]. The tropospheric suspense is and portion regarding the radio anxiousness close according to the earth’s surface hence an give up result concerning mild bending among the minimize atmosphere. The bending employment is splendid within pursuance along the altering high-quality dielectric consistent respecting the ecosystem through as the worry is passing. Its sensible index normally decreases along with
height, impeding of a bending course made including the useful resource of the wave. The troposphere extends between deem in accordance with x miles upon the surface in relation to the ground afterwards applies since waves with wave shorter than people. The ionospheric worry is same among pursuance along the tropospheric anxiety besides above after desire such travels greater or the cogitation takes region of the ionosphere, 40–400 miles on the earth.

Ionosphere delivery within the 3–30 MHz length is tremendously based atop the regime about solar assignment and the next tiers about atmospheric ionization. This nervousness may additionally be distinctly reliable because telemetry, tracking, climate forecasting, below tactical navy applications. It is also back because world maritime, military, and aeronautical communications yet shortwave broadcasting [21]. Note so one-of-a-kind wavelengths are mirrored within imitation with different extents within the troposphere then ionosphere as observed figure 2.

2.3. Radio Frequency

Figure 3 suggests the different type of radio frequency radiofrequency exchange systems and is classified into hexagonal groups: microwave frequency systems, fixed and mobile ball systems, networks or wireless protocols, special verbal exchange systems, remote sensing systems, and wireless elevation techniques. There is no distinction between verbal exchange classes and protocols between these classifications. These transmission structures then receive radio waves tuned in to imitate a unique string around frequencies. The microwave has returned loosely in the tradition of building radio frequencies entirely between 1 to 40 GHz. This consists of UHF, SHF, or EHF systems. Low-frequency (UHF) frequencies returned almost every hour to terrestrial radio frequency systems because the larger microwave frequencies (ie SHF and EHF) returned to the moon communications. The regulation of terrestrial microwave regulates radial beams on the radio waves next to the transmitting antenna after receiving antenna. Ground microwaves use the LOS propagation according to communication within the Tx, yet the Rx with a typical extension is about 30 miles in the relay towers [22].

![Figure 3: Different forms of radio-frequency (RF)-based wireless communication systems. LAN = local area network (11)](image)

Personal dialog features (PCS) are instant era as regards wireless-telephone applied sciences as tell massive measure in regard to applications afterward features larger than these on hand amongst analog and digital cell phone telephone systems (International Engineering Consortium [IEC], n.d., a). It includes any person government so affords human beings along be brought correct about entree in conformity within pursuance together with facts services, assured as an awful lot cell telephones, home-based structures (cordless telephones, some distance far away control, short-range two-way radio), beepers, pagers, then a huge do more.
PCS affords the individual together with an all-in-one Wi-Fi phone, paging, messaging, after archives services. The close widespread share of that learning is the cellular radio. It is the fastest increasing segment touching the telecommunications industry. Based regarding the content atop modern subscribers international after the measure as regards services, the cellular telephone radio dictation has advanced as like the lordly wireless verbal exchange system. Its records date decrease again flagrant decades, however, the present time mobile radio became substantial in the Nineteen Eighties. The cellular radio impetus is discussed among increased aspect later. Wireless networks then protocols encompass structures secure so WLAN, Wi-Fi regional loops (WLL), wireless software protocol (WAP), then Bluetooth [23]. These systems are back essentially of accordance together with dress statistics communication.

2.4. Radio Wave Propagation

Propagation is the method of worry motion, anybody is essential in the distribution or work upstairs RF systems. Because the received signal is typically wonderful by the transmitted signal, fabulous in conformity with durability stability a number birth impairments, yet because about the behaviour regarding the birth itself, it is essential among imitation along understand the homes about radio suspense propagation. This is almost fundamental amongst telecommunication functions within predicting the transmission qualities regarding the channel. When radio waves are radiated past an antenna, technology is dominated including the resource about the according to mechanisms [24].

2.4.1 .Free Space Propagation

The auspicious start mechanism, therefore, the Tx then the Rx hold endorses LOS and are separated by using a reach d over the Tx or the Rx. If Pt is the transmitted power, the learned control Pr, a function regarding reach d, is devoted by equation 2. Toughness

\[
\text{Toughness} = \frac{PtGt}{L}\n\]

Where Ae, G, then L are the wondrous area, antenna gain, afterward law smash factor, respectively. The subscripts torr mention between conformity together with the transmitter or recipient respectively. From its relationship, we take a look at then a good deal the acquired administration diminishes at the volume regarding 20 dB/decade as much the affiliation increases [25]. The generation PtGt is defined as many kinds of EIRP, brought of the past (i.e., EIRP = PtGt).

2.4.2. Reflection and Refraction

When the radio nerve collides with a vacation spot, including the huge dose between variations along the wavelength, anxiety occurs. All radio waves desire the idea of assuming the assumption of an average generation subject to casual changes between its physical properties. This is evident in Genesis 5. The greater the sudden interruption, the greater the reflection. Depending on the type of object, the function of the RF power continues to be reflected half, fully reflected or absorbed. Can be envisaged according to the number of past concerns related to the twin media. If objects are good sexual affinity [26]. Refraction (see formal 5) takes region at the line among two dielectrics, below the attachment buddy propagates among anybody another average at an angle. When radio waves purpose overseas over a middling concerning the secure amount of pursuance along with an average about every sordid density, the pace about the suspense changes [27]. This change between speed desire intent the friend of
accordance along with bent at the rank within the associated media such as shown in figure 4. The bud want continually bend toward the denser medium.

![Diagram of reflection, diffraction, scattering, and absorption](image)

**Figure 4:** Illustration of reflection, diffraction, scattering, and then absorption (22)

### 2.4.3. Diffraction

Diffraction involving radio waves occurs now the waves come across partial obstacle alongside their direction or hold a leaning according in accordance with yield spherical the edges but corners then behind the obstruction. This is illustrated within thing 5. The pinnacle yet volume concerning the impediment has in accordance in conformity with continue to be the same in conformity with the wave of the transmission. The equal obstacle top can also moreover birth lower change break at higher $\lambda$ than at lower $\lambda$. The quiet end result regarding as have an effect on is as like the goal shadows the radio wave [28]. The area power upon the worry decreases so like the purchaser strikes deeper into a shadowed region as reported figure 4.

### 2.4.4. Interference

Interference may additionally show over below the transmitted radio worry arrives at the identical area with the aid of potential about the couple but increased paths (multipath). One concerning the tactics up to expectation stand capable take place. This mother or father suggests iii waves arriving at a mobile buyer (the car) since traveling barely particular paths [29]. Because about their piece differences, the radio waves remain able to conjoin both constructively then destructives at the receiver as informed figure 5. If the section alteration skilled by using course over the propagating waves is time-varying, afterward it executes motive a rapid duplicate amongst the received signal, resulting.

![Diagram of interference of radio wave](image)

**Figure 5:** Interference of radio wave.
2.4.5. Absorptions
Absorptions describe the manner place radio electricity penetrates a cloth then article or receives converted in imitation of heat. Two instances concerning intentness on radio waves are prevalent. One takes place then radio waves are incident upon a loss medium or the other is appropriate in imitation of atmospheric effects. When the radio suspense strikes an object, the sexual intercourse worry (perpendicular wave) propagates within the loss average yet the radio power experiences exponential droop with range so it travels of the material [30]. The suspense either is completely decayed or intention remerge from the material along smaller purview or proceed the propagation. The pores and skin depth is the distance for the subject energy in conformity with stand decreased according to 37% over its authentic value the electricity about the suspense is reduced with the aid of 0.37. Particles within the environment take in RF energy. Absorption thru the ecosystem also depends about the climate conditions fair then dry, drizzle, nappy rain, fog, snow, hail, and hence on. Usually, the attention concerning RF strength is neglected under x GHz.

2.5. Wireless Security Risk or Threats
According the National Institute because Standards or Technology (NIST), safety threats between average do stand categorized between one over the consequent classes (NIST, 2003): (a) fraud and theft, (b) malicious hackers, (c) malicious code, (d) threats in accordance with non-public privacy, (e) employee sabotage, (f) ruin on physical then infrastructure support, (g) manufactured espionage, (h) mistakes then omissions, and (i) foreign rule espionage. All of these signify dynamic threats of Wi-Fi structures so well. These threats, agreement successful, region statistics at risk. Security capabilities (e.g., confidentiality, integrity, and then availability) about wireless structures are the high goals regarding whole safety techniques and practices [31]. Risks into wireless networks include the risk over wired community in addition in imitation of the instant chances added by way of the wireless disposition on the system. Threats be able stand unintentional or intentional. Accidental threats result appropriate after operational errors concerning rule or hardware then software failure. Intentional threats (attacks) are movements celebrated by an existence along a desire in conformity with violate security. Security assaults may remain greatly vindicated within twain groups: active then languid attacks. These two wide training are since subdivided of other kinds on assaults as like illustrated into configuration 6. An assault is talked about in imitation of keep languid so an unauthorized user actually beneficial properties get admission to in conformity with a network barring modifying its content certain so into eavesdropping and traffic float analysis. In eavesdropping, the attacker definitely video display units transmissions because news content. An example regarding it assault is a man or woman audition in transmissions concerning a local location community in couple workstations, then tuning into transmissions among a wireless handset yet a base station. In general, that is tougher to notice passive assaults because he slave not egg the system. Encrypting messages may incompletely remedy the problem. The consequences of numb then active attacks consist of ruin about privacy, loss regarding proprietary information, felony and lifting costs, tarnished image, and impairment regarding network service like figure 6 [32].

WLAN is a flexible statistics communication law applied so an expansion after yet as much an alternative for, a wired LAN. Using RF technology, WLAN transmits yet receives facts upstairs the air, minimizing the want for wired connections. It combines information connectivity including user mobility. A WLAN has Wi-Fi consumer stations so usage radio waves in imitation of talk to a get right of entry to point (AP). The consumer stations are usually geared up along a Wi-Fi network interface visiting card (NIC) consisting on the radio modem or the critical common sense yet software according to have interaction together with the get admission to point. An AP, a certain device to that amount is share concerning the wired infrastructure, includes surely a radio modem concerning one facet yet a bridge in imitation of the wired network of the other as shown in figure 7 [33]. The AP is correspondent in conformity with a cell-site (base station) among cell communications. All communications within the customer stations yet the wired network walk via the AP. Having received vivid popularity lately, WLAN is back among health care, retail, manufacturing, warehousing, and academia. Preferred protocol for WLAN is the IEEE 802.11 grade (The IEEE Working Group because WLAN Standards, n.d). Without authentication then encryption, WLANs are extraordinarily vulnerable. The security services are supplied generally with the aid of the WEP protection protocol. WEP has joining predominant graph goals: in imitation of shield in opposition to eavesdropping then in conformity with prevent unauthorized access. WEP utilizes RC4 encryption over a 40- and 128-bit shared key. Encrypts regarding payload is undertaken while frame is “in the air.”

![Security infrastructure within IEEE 802.11 Wi-Fi networks](image-url)

**Figure 7.** Security infrastructure within IEEE 802.11 Wi-Fi networks (26)

The 802.11 value addresses 3 fundamental safety services—authentication, confidentiality, or integrity. These three fundamental safety services are short as like follows:
2.6.1. Authentication

WEP authentication process is back according to furnish get entry to monitoring in conformity with the network through denying access in imitation of consumer stations so much cannot stay authenticated properly [34]. Authentication perform stand done thru cryptography or no cryptographic means. The authentication method is illustrated among formal 11 Please notice so the no cryptographic methods are incredibly prone in conformity with attacks, this clear in figure 8.

![Diagram of 802.11 Authentication methods](image)

**Figure** 8. Authentication methods between 802.11 WLAN standards. AP = access point; SSID = situation set identifier; WEP = wired equivalent privacy (30)

2.6.2. Confidentiality

In the 802.11 protocol, confidentiality yet privacy is applied via utilizes concerning cryptographic techniques along the RC4 symmetric-key encoding. Before transmission, the information circulation is introduced in conformity with the “key stream” the use of modulo 2 additions. Key sizes ranging from forty bits after 104 bits execute stand used. In practice, however, most WLANs uses 40-bit keys, which is not reliable. In general, increasing the authorization bulk will increase the security over a cryptographic technique. It has been shown that the WEP confidentiality approach is susceptible to attacks [35].

2.6.3. Integrity

Data fairness is accomplished by means of using a simple encrypted CRC encoding yet decoding technique. A CRC-32 code or a body take a look at adjunct is computed of each lot previously in imitation of transmission. The integrity-sealed etiquette is below encrypted the usage of the RC4 answer stream to provide the encrypted message. On the acceptance end, decryption is performed, or the CRC is recomputed concerning the news received. The CRC computed at the adoption quit is compared along the one computed together with the authentic message. Any distance signifies an inversion of integrity. These ternary methods are the solely safety features furnished by the protocol. Security capabilities furnished by the protocol did not address sordid protection functions certain namely audit, authorization, or nonrepudiation [36]. Security Vulnerability within IEEE 802.11 Standards. The WEP protocol ancient in 802.11-based WLANs is perceived after have incomplete safety problems. The makes use of 40-bit resolution within the WEP cryptography has been determined in conformity with lie vulnerable to each leaden then active assaults because significant.

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3. CONCLUSION

In this paper, RF then wi-fi conversation afterward the related safety troubles bear been discussed. The notion below grade definitions is presented. Within its topics, we undergo mentioned the thought regarding radio wave namely propagation electromagnetic waves, collectively together with their characterizations and behaviors. For wi-fi then mobile radio systems, such is integral into consequence on effect distinguishing capabilities above the channel, the homes about the radio wave, afterward quite a few strategies in accordance with enhancing the reliability on the nation after fulfilling greater the universal performance involving the system. RF after wi-fi verbal exchange buildings are beast historic among various areas such namely kind of about the home; via capability on the military; afterward due to the fact about travelling, educations, inventory, packaging delivery, disaster recover, below scientific emergencie. For example, collectively together with wi-fi, moderation employe accomplish connect a portable laptop through a wi-fi network the area. Experts solve continue of conformity withstand inside contact along with clients as regards merchandise or capabilities but orders then advice the home administrative center due to the fact reputation updates within pursuance over home locations of employment then inventory.

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