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(71) Applicant: **INTEL CORPORATION** [US/US]; 2200 Mission College Boulevard, Santa Clara, California 95054 (US).

(72) Inventors: **LOMAYEV, Artyom**; Turgeneva str 30, Nizhny Novgorod, 603024 (RU). **MALTSEV, Alexander**; 1-7 Verchne-Pecherskay Str., Nizhny Novgorod, 603163 (RU). **DA SILVA, Claudio**; 3041 NW 111th Terrace, Portland, Oregon 97229 (US). **CORDEIRO, Carlos**; 4038 NW McGrath Court, Portland, Oregon 97229 (US). **GENOSSAR, Michael**; 62 Binyamin, 7173221 Modiin Maccabim Reut (IL).

(74) Agent: **GRIFFIN III, Malvern U.** et al.; Eversheds Sutherland (US) LLP, 999 Peachtree Street NE, Suite 2300, Atlanta, Georgia 30309 (US).

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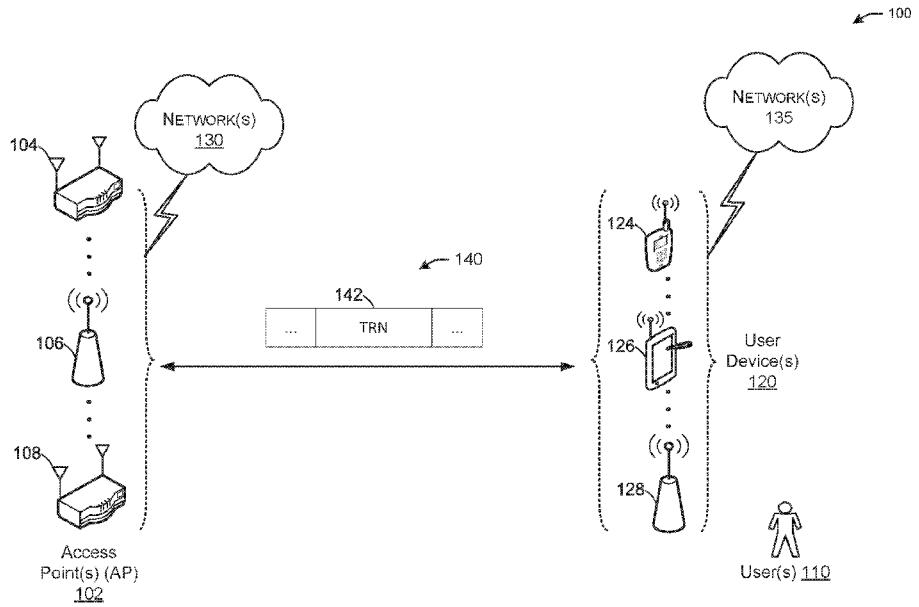

FIG. 1

(57) Abstract: This disclosure describes systems, methods, and devices related to enhanced directional multi-gigabit (EDMG) training (TRN) unit definition for orthogonal frequency-division multiplexing (OFDM). A device may determine one or more transmit chains of the device. The device may determine one or more TRN units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains. The device may determine one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units. The device may cause to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

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ENHANCED DIRECTIONAL MULTI-GIGABIT TRAINING UNIT DEFINITION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application 62/529,331, filed July 6, 2017, the disclosure of which is incorporated herein by reference as if set forth in full.

TECHNICAL FIELD

[0002] This disclosure generally relates to systems and methods for wireless communications and, more particularly, to enhanced directional multi-gigabit (EDMG) training (TRN) unit definition for orthogonal frequency-division multiplexing (OFDM).

BACKGROUND

[0003] Wireless devices are becoming widely prevalent and are increasingly requesting access to wireless channels. IEEE 802.11ay can refer to a standard in the mmWave (60 GHz) band, which can be related to IEEE 802.11ad standard, also referred to as WiGig. IEEE 802.11ay describes standards that can increase the transmission data rate in wireless networks, for example, by applying multiple-input multiple-output (MIMO) techniques.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 depicts a network diagram illustrating an example network environment for enhanced directional multi-gigabit (EDMG) training (TRN) unit definition system, in accordance with one or more example embodiments of the present disclosure.

[0005] FIG. 2 depicts a flow diagram of an illustrative process for EDMG OFDM TRN unit definition system, in accordance with one or more example embodiments of the present disclosure.

[0006] FIG. 3 depicts a functional diagram of an example communication station that may be suitable for use as a user device, in accordance with one or more example embodiments of the present disclosure.

[0007] FIG. 4 depicts a block diagram of an example machine upon which any of one or more techniques (e.g., methods) may be performed, in accordance with one or more example embodiments of the present disclosure.

DETAILED DESCRIPTION

[0008] The following description and the drawings sufficiently illustrate specific embodiments to enable those skilled in the art to practice them. Other embodiments may incorporate structural, logical, electrical, process, and other changes. Portions and features of some embodiments may be included in, or substituted for, those of other embodiments. Embodiments set forth in the claims encompass all available equivalents of those claims.

[0009] Devices may communicate over a next generation 60 GHz (NG60) network, an enhanced directional multi-gigabit (EDMG) network, and/or any other network. Devices operating in EDMG may be referred to herein as EDMG devices. This may include user devices, and/or APs or other devices capable of communicating in accordance to a communication standard, including but not limited to IEEE 802.11ad and/or IEEE 802.11ay.

[0010] A typical EDMG PPDU frame format may be composed of a legacy preamble, a legacy header, an EDMG-Header-A containing SU-MIMO parameters that carries information required to interpret EDMG PPDUs, an EDMG short training field (EDMG-STF), an EDMG channel estimation field (EDMG-CEF), an EDMG-Header-B containing MU-MIMO parameters, a payload data part, and an optional automatic gain control (AGC) and an optional beamforming TRN units appended at the end of the frame. The legacy preamble, legacy header, and a new EDMG-Header-A may be transmitted using SISO single carrier (SC) PHY modulation. This provides an opportunity for the legacy DMG devices to decode the legacy header and identify (using a signaling bit) that the frame contains the EDMG part not compatible with its implementation. This realizes a backward compatibility requirement. At the same time, EDMG devices may decode the EDMG-Header-A using SISO SC PHY modulation and extract the required parameters for MIMO frame reception. The transmission of the rest of the EDMG frame may be done using MIMO modulation.

[0011] The IEEE 802.11ay task group Task Group (TGay) started development of the new standard in the mmWave (60GHz) band, which is an evolution of the IEEE 802.11ad standard, also known as WiGig. IEEE 802.11ay proposes to increase the transmission data rate by applying MIMO and channel bonding techniques.

[0012] Example embodiments described herein provide certain systems, methods, and devices for EDMG orthogonal frequency-division multiplexing (OFDM) training (TRN) unit definition.

[0013] In one embodiment, an EDMG OFDM TRN unit definition system may facilitate one or more training operations for directional signal transmission and/or reception. The EDMG OFDM TRN unit definition system may define TRN units for an EDMG OFDM physical layer (PHY). The TRN units may be defined in the frequency domain per transmit chain using a sequence set. The number of different sequences in the set may be equal to the number of transmit chains. The TRNs may be defined for different channel bonding factors, N_{CB} = 1, 2, 3, and 4.

[0014] In one embodiment, a TRN unit may be included in a PHY packet. For example, a TRN unit may be appended to the end of a PHY packet. The TRN unit may be used to perform one or more training operations. The TRN unit definition may depend on one or more of a number of transmit chains of a device and/or a channel bonding factor. The 802.11ay specification defines a number of channel frequencies associated with the different channel bonding factors, N_{CB} = 1, 2, 3, and 4. For example, channel bonding factor 1 may correspond to a 2.16 GHz channel. Channel bonding factor 2 may correspond to a 4.32 GHz channel. Channel bonding factor 3 may correspond to a 6.48 GHz channel. Channel bonding factor 4 may correspond to a 8.64 GHz channel.

[0015] In one embodiment, a TRN unit may be defined per transmit chain of a device. A sequence of a TRN unit may be different for each transmit chain. The sequence may be defined in the frequency domain using an alphabet comprising {+1, -1, +j, -j} (e.g., positive and negative real and complex unit numbers). A number of different sequences may be equal to a number of different transmit chains. Note that the TRN sequence may vary based on different TRN channel bonding factors.

[0016] In one embodiment, a TRN unit (e.g., a TRN waveform) may be defined in the time domain. In the time domain, the TRN unit may be a function of an inverse discrete Fourier transform applied for the sequence, wherein the sequence may be defined as EDMG-CEF_k^{iTX}. The EDMG-CEF sequence may be defined in the frequency domain for each transmit chain and a channel bonding factor. In other words, for a given transmit chain of a plurality of transmit chains of a device and for a given channel bonding factor, a EDMG-CEF sequence may be obtained, wherein the EDMG-CEF sequence is defined in the frequency domain. A TRN unit may be defined in the time domain by applying an inverse discrete Fourier transform to the EDMG-CEF sequence. In other words, the EDMG-CEF sequence may be converted from the frequency domain to the time domain by application of the

inverse discrete Fourier transform.

[0017] In one embodiment, the TRN unit may be a function of a number of active tones, a window function, a EDMG-CEF mapping matrix, a EDMG-CEF sequence, and an exponential term. For example, the TRN unit may be equal to an inverse of the square root of a number of active tones times a window function times a summation of an EDMG-CEF mapping matrix times a sequence times an exponential function.

[0018] In one embodiment, the number of active tones may be equal to a number of occupied subcarriers less a number of pilot tones. The window function may be a function that may be applied to smooth a transition between consecutive ODMF symbols. The window function may be implementation specific. In other words, the window function may be a function that has a value of zero outside of a set interval.

[0019] In one embodiment, the summation of the EDMG-CEF mapping matrix may be a summation from a negative of the number of subcarriers ($-N_{SR}$) to a positive of the number of subcarriers (N_{SR}). The mapping matrix that is summed may be defined depending on a number of spatial streams (N_{STS}). In other words, for a given number of spatial streams (e.g., N_{STS} = 1, 2, 3, 4, 5, 6, 7, or 8), a mapping matrix may be obtained and summed from $-N_{SR}$ to N_{SR}. The mapping matrix may have a number of rows that is equal to a number of transmit chains and a number of columns that is equal to a number of spatial time streams.

[0020] In one embodiment, the EDMG-CEF sequence may be defined in the frequency domain and may be a function of a channel bonding factor and a transmit chain index value. The EDMG-CEF sequence may include sequence pairs $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$, wherein the length N of the sequence pairs depends on a channel bonding factor. In other words, each of $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$ may be defined based on a transmit chain index value and a channel bonding factor. The EDMG-CEF may be defined as $[Seq^{iTX}_{left,N}, 0, 0, 0, Seq^{iTX}_{right,N}]$.

[0021] In one embodiment, the exponential term may be a function of a sample time duration T_s and a guard interval T_{GI}. The sample time duration may be equal to the inverse of the sample frequency F_s. The guard interval may be a long guard interval, wherein the long guard interval may be equal to 72 nanoseconds (ns).

[0022] In one embodiment, after a PHY packet that includes the TRN unit has been sent by a first device to a receiving device, the first device may receive feedback from the receiving device. The first device may modify one or more settings based at least in part on the feedback from the receiving device.

[0023] The above descriptions are for purposes of illustration and are not meant to be limiting. Numerous other examples, configurations, processes, etc., may exist, some of which are described in greater detail below. Example embodiments will now be described with reference to the accompanying figures.

[0024] FIG. 1 is a network diagram illustrating an example network environment, in accordance with one or more example embodiments of the present disclosure. Wireless network 100 may include one or more user device(s) 120 and one or more access point(s) (AP) 102, which may communicate in accordance with IEEE 802.11 communication standards, such as the IEEE 802.11ad and/or IEEE 802.11ay specifications. The user device(s) 120 may be referred to as stations (STAs). The user device(s) 120 may be mobile devices that are non-stationary and do not have fixed locations. Although the AP 102 is shown to be communicating on multiple antennas with user devices 120, it should be understood that this is only for illustrative purposes and that any user device 120 may also communicate using multiple antennas with other user devices 120 and/or AP 102.

[0025] In some embodiments, the user devices 120 and AP 102 may include one or more computer systems similar to that of the functional diagram of FIG. 3 and/or the example machine/system of FIG. 4.

[0026] One or more illustrative user device(s) 120 and/or AP 102 may be operable by one or more user(s) 110. The user device(s) 120 (e.g., 124, 126, or 128) and/or AP 102 may include any suitable processor-driven device including, but not limited to, a mobile device or a non-mobile device, e.g., a static device. For example, user device(s) 120 and/or AP 102 may include, a user equipment (UE), a station (STA), an access point (AP), a personal computer (PC), a wearable wireless device (e.g., bracelet, watch, glasses, ring, etc.), a desktop computer, a mobile computer, a laptop computer, an ultrabook™ computer, a notebook computer, a tablet computer, a server computer, a handheld computer, a handheld device, an internet of things (IoT) device, a sensor device, a PDA device, a handheld PDA device, an on-board device, an off-board device, a hybrid device (e.g., combining cellular phone functionalities with PDA device functionalities), a consumer device, a vehicular device, a non-vehicular device, a mobile or portable device, a non-mobile or non-portable device, a mobile phone, a cellular telephone, a PCS device, a PDA device which incorporates a wireless communication device, a mobile or portable GPS device, a DVB device, a relatively small computing device, a non-desktop computer, a “carry small live large”

(CSLL) device, an ultra mobile device (UMD), an ultra mobile PC (UMPC), a mobile internet device (MID), an "origami" device or computing device, a device that supports dynamically composable computing (DCC), a context-aware device, a video device, an audio device, an A/V device, a set-top-box (STB), a blu-ray disc (BD) player, a BD recorder, a digital video disc (DVD) player, a high definition (HD) DVD player, a DVD recorder, a HD DVD recorder, a personal video recorder (PVR), a broadcast HD receiver, a video source, an audio source, a video sink, an audio sink, a stereo tuner, a broadcast radio receiver, a flat panel display, a personal media player (PMP), a digital video camera (DVC), a digital audio player, a speaker, an audio receiver, an audio amplifier, a gaming device, a data source, a data sink, a digital still camera (DSC), a media player, a smartphone, a television, a music player, or the like. It is understood that the above is a list of devices. However, other devices, including smart devices such as lamps, climate control, car components, household components, appliances, etc. may also be included in this list.

[0027] Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may be configured to communicate with each other via one or more communications networks 130 and/or 135 wirelessly or wired. Any of the communications networks 130 and/or 135 may include, but not limited to, any one of a combination of different types of suitable communications networks such as, for example, broadcasting networks, cable networks, public networks (e.g., the Internet), private networks, wireless networks, cellular networks, or any other suitable private and/or public networks. Further, any of the communications networks 130 and/or 135 may have any suitable communication range associated therewith and may include, for example, global networks (e.g., the Internet), metropolitan area networks (MANs), wide area networks (WANs), local area networks (LANs), or personal area networks (PANs). In addition, any of the communications networks 130 and/or 135 may include any type of medium over which network traffic may be carried including, but not limited to, coaxial cable, twisted-pair wire, optical fiber, a hybrid fiber coaxial (HFC) medium, microwave terrestrial transceivers, radio frequency communication mediums, white space communication mediums, ultra-high frequency communication mediums, satellite communication mediums, or any combination thereof.

[0028] Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may include one or more communications antennas. The one or more communications antennas may be any suitable type of antennas corresponding to the communications protocols used by

the user device(s) 120 (e.g., user devices 124, 126 and 128), and AP 102. Some non-limiting examples of suitable communications antennas include Wi-Fi antennas, Institute of Electrical and Electronics Engineers (IEEE) 802.11 family of standards compatible antennas, directional antennas, non-directional antennas, dipole antennas, folded dipole antennas, patch antennas, multiple-input multiple-output (MIMO) antennas, omnidirectional antennas, quasi-omnidirectional antennas, or the like. The one or more communications antennas may be communicatively coupled to a radio component to transmit and/or receive signals, such as communications signals to and/or from the user devices 120 and/or AP 102.

[0029] Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may be configured to perform directional transmission and/or directional reception in conjunction with wirelessly communicating in a wireless network. Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may be configured to perform such directional transmission and/or reception using a set of multiple antenna arrays (e.g., DMG antenna arrays or the like). Each of the multiple antenna arrays may be used for transmission and/or reception in a particular respective direction or range of directions. Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may be configured to perform any given directional transmission towards one or more defined transmit sectors. Any of the user device(s) 120 (e.g., user devices 124, 126, 128), and AP 102 may be configured to perform any given directional reception from one or more defined receive sectors.

[0030] MIMO beamforming in a wireless network may be accomplished using RF beamforming and/or digital beamforming. In some embodiments, in performing a given MIMO transmission, user devices 120 and/or AP 102 may be configured to use all or a subset of its one or more communications antennas to perform MIMO beamforming.

[0031] Any of the user devices 120 (e.g., user devices 124, 126, 128), and AP 102 may include any suitable radio and/or transceiver for transmitting and/or receiving radio frequency (RF) signals in the bandwidth and/or channels corresponding to the communications protocols utilized by any of the user device(s) 120 and AP 102 to communicate with each other. The radio components may include hardware and/or software to modulate and/or demodulate communications signals according to pre-established transmission protocols. The radio components may further have hardware and/or software instructions to communicate via one or more Wi-Fi and/or Wi-Fi direct protocols, as standardized by the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standards. In certain example

embodiments, the radio component, in cooperation with the communications antennas, may be configured to communicate via 2.4 GHz channels (e.g. 802.11b, 802.11g, 802.11n, 802.11ax), 5 GHz channels (e.g. 802.11n, 802.11ac, 802.11ax), or 60 GHZ channels (e.g. 802.11ad). In some embodiments, non-Wi-Fi protocols may be used for communications between devices, such as Bluetooth, dedicated short-range communication (DSRC), Ultra-High Frequency (UHF) (e.g. IEEE 802.11af, IEEE 802.22), white band frequency (e.g., white spaces), or other packetized radio communications. The radio component may include any known receiver and baseband suitable for communicating via the communications protocols. The radio component may further include a low noise amplifier (LNA), additional signal amplifiers, an analog-to-digital (A/D) converter, one or more buffers, and digital baseband.

[0032] Some demonstrative embodiments may be used in conjunction with a wireless communication network communicating over a frequency band of 60 GHz. However, other embodiments may be implemented utilizing any other suitable wireless communication frequency bands, for example, an extremely high frequency (EHF) band (the millimeter wave (mmWave) frequency band), a frequency band within the frequency band of between 20 GHz and 300 GHz, a WLAN frequency band, a WPAN frequency band, a frequency band according to the WGA specification, and the like.

[0033] The phrases "directional multi-gigabit (DMG)" and "directional band (DBand)," as used herein, may relate to a frequency band wherein the channel starting frequency is above 45 GHz. In one example, DMG communications may involve one or more directional links to communicate at a rate of multiple gigabits per second, for example, at least 1 gigabit per second, 7 gigabits per second, or any other rate.

[0034] In some demonstrative embodiments, the user device(s) 120 and/or the AP 102 may be configured to operate in accordance with one or more specifications, including one or more IEEE 802.11 specifications, (e.g., an IEEE 802.11ad specification, an IEEE 802.11ay specification, and/or any other specification and/or protocol).

[0035] In one embodiment, and with reference to FIG. 1, there is shown a frame 140 transmitted between. The frame 140 may include one or more fields, for example, beamforming training units (TRN) 142. The number of TRN units 142 may correspond to a number of transmit chains of the sending device. A TRN unit may be included in a PHY packet. For example, a TRN unit may be appended to the end of a PHY packet. The TRN unit may be used to perform one or more training operations. As noted, the TRN unit definition

may depend on (e.g., be a function of) one or more of a number of transmit chains of a device and/or a channel bonding factor. The 802.11ay specification defines a number of channel frequencies associated with the different channel bonding factors, N_{CB} = 1, 2, 3, and 4. For example, channel bonding factor 1 may correspond to a 2.16 GHz channel. Channel bonding factor 2 may correspond to a 4.32 GHz channel. Channel bonding factor 3 may correspond to a 6.48 GHz channel. Channel bonding factor 4 may correspond to a 8.64 GHz channel.

[0036] In one embodiment, the TRN field may be composed of N TRN units. Each TRN unit may be defined in a frequency domain as an EDMG channel estimation field (EDMG-CEF) for a given channel bonding factor. In other words, the TRN units may be defined in the frequency domain per transmit chain using a sequence set. The number of different sequences in the set may be equal to the number of transmit chains. The TRNs may be defined for different channel bonding factors, N_{CB} = 1, 2, 3, and 4.

[0037] In one embodiment, a TRN waveform may be defined in the time domain. An inverse discrete Fourier transform may be applied for the sequence, which may be defined as $EDMG\text{-}CEF_k^{iTX}$. The index k may be a subcarrier index and the index i_{TX} may be defined as a transmit chain index. In one embodiment, a sequence of a TRN unit may be different for each transmit chain. The sequence may be defined in the frequency domain using an alphabet comprising {+1, -1, +j, -j} (e.g., positive and negative real and complex unit numbers). A number of different sequences may be equal to a number of different transmit chains. Note that the TRN sequence may be different for different TRN channel bonding factors.

[0038] In one embodiment, the TRN unit may be a function of an inverse discrete Fourier transform applied for the sequence, wherein the sequence may be defined as $EDMG\text{-}CEF_k^{iTX}$. The EDMG-CEF sequence may be defined in the frequency domain for each transmit chain and a channel bonding factor. In other words, for a given transmit chain of a plurality of transmit chains of a device and for a given channel bonding factor, a EDMG-CEF sequence may be obtained, wherein the EDMG-CEF sequence is defined in the frequency domain. A TRN unit may be defined in the time domain by applying an inverse discrete Fourier transform to the EDMG-CEF sequence. In other words, the EDMG-CEF sequence may be converted from the frequency domain to the time domain by application of the inverse discrete Fourier transform.

[0039] In one embodiment, the TRN unit may be a function of a number of active tones, a window function, a EDMG-CEF mapping matrix, a EDMG-CEF sequence, and an

exponential term. For example, the TRN unit may be equal to an inverse of the square root of a number of active tones times a window function times a summation of an EDMG-CEF mapping matrix times a sequence times an exponential function. The exponential term may be a function of a sample time duration T_s and a guard interval T_{GI}. The sample time duration may be equal to the inverse of the sample frequency F_s. The guard interval may be a long guard interval, wherein the long guard interval may be equal to 72 nanoseconds (ns).The EDMG OFDM TRN unit in time domain may be defined at the OFDM sampling rate (F_s) equal to N_{CB}*2.64 GHz and sample time duration (T_s) $T_s = 1/F_s$ nanoseconds (ns) for the i_{TX}-th transmit chain. The EDMG OFDM TRN unit may be defined as follows:

$$r_{TRN}^{n,i_{TX}}\left(qT_s\right)=\frac{1}{\sqrt{N_{EDMG-CEF}^{Tone}}}w\left(qT_s\right)\cdot$$

$$\cdot\sum_{k=-N_{SR}}^{N_{SR}}\left[P_{EDMG-CEF}\right]_{i_{TX},n}EDMG-CEF_k^{i_{TX}}\exp\left(j2\pi k\Delta_F\left(qT_s-T_{GI\,long}\right)\right),$$

$$1\le n\le N_{EDMG-CEF}^{N_{TX}}$$

[0040] Where:

[0041] $N_{EDMG-CEF}^{Tone}=N_{ST}-N_{DC}$ is the total number of active tones. The total number of active tones may be equal to the number of occupied subcarriers (N_{ST}) minus the number of data tones (N_{DT}).

[0042] $P_{EDMG-CEF}$ is the EDMG-CEF mapping matrix defined below. The summation of the EDMG-CEF mapping matrix may be a summation from a negative of the number of subcarriers (-N_{SR}) to a positive of the number of subcarriers (N_{SR}). The mapping matrix that is summed may be defined depending on a number of spatial streams (N_{STS}). In other words, for a given number of spatial streams (e.g., N_{STS} = 1, 2, 3, 4, 5, 6, 7, or 8), a mapping matrix may be obtained and summed from -N_{SR} to N_{SR}. The mapping matrix may have a number of rows that is equal to a number of transmit chains and a number of columns that is equal to a number of spatial time streams.

[0043] $N_{EDMG-CEF}^{N_{STS}}$ is the number of OFDM symbols in EDMG CEF for given total number of space-time streams N_{STS} defined below.

[0044] $[\,]_{m,n}$ is a matrix element from m-th row and n-th column.

[0045] $w(qT_s)$ is window function applied to smooth the transitions between consecutive OFDM symbols. Note that the definition of the window function may be implementation specific. The window function may be a function that has a value of zero outside of a set interval.

[0046] In one embodiment, the EDMG-CEF sequence for a TRN unit may depend on the channel on which the TRN unit may be transmitted. A device (e.g., AP(s) 102 and/or user devices 120 of FIG. 1) may transmit a TRN unit over a 2.16 GHz channel, a 4.32 GHz channel, a 6.48 GHz channel, and/or an 8.64 GHz channel. The EDMG-CEF sequence may be defined in the frequency domain and may be a function of a channel bonding factor and a transmit chain index value. The EDMG-CEF sequence may include sequence pairs $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$, wherein the length N of the sequence pairs depends on a channel bonding factor. In other words, each of $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$ may be defined based on a transmit chain index value and a channel bonding factor. The EDMG-CEF may be defined as $[Seq^{iTX}_{left,N}, 0, 0, 0, Seq^{iTX}_{right,N}]$.

[0047] In one embodiment, for EDMG PPDU transmissions using the EDMG OFDM mode over 2.16 GHz channel, the EDMG-CEF sequence for a TRN unit may be defined in frequency domain for *i*-th space-time stream as follows:

[0048] $EDMG\text{-}CEF^{iTX}_{-177,177} = [Seq^{iTX}_{left,176}, 0, 0, 0, Seq^{iTX}_{right,176}]$, for i_{TX} =1, 2, 3, 4, 5, 6, 7, 8. Note that $Seq^{iTX}_{left,176}$ and $Seq^{iTX}_{right,176}$ are defined in the Table 1 and Table 2, respectively, below.

[0049] In one embodiment, for EDMG PPDU transmissions using the EDMG OFDM mode over 4.32 GHz channel, the EDMG-CEF sequence may be defined in frequency domain for *i*-th space-time stream as follows:

[0050] $EDMG\text{-}CEF^{iTX}_{-386,386} = [Seq^{iTX}_{left,385}, 0, 0, 0, Seq^{iTX}_{right,385}]$, for i_{TX} =1, 2, 3, 4, 5, 6, 7, 8. Note that $Seq^{iTX}_{left,385}$ and $Seq^{iTX}_{right,385}$ are defined in Table 3 and Table 4, respectively, below.

[0051] In one embodiment, for EDMG PPDU transmissions using the EDMG OFDM mode over 6.48 GHz channel, the EDMG-CEF sequence may be defined in frequency domain for *i*-th space-time stream as follows:

[0052] $EDMG\text{-}CEF^{iTX}_{-596,596} = [Seq^{iTX}_{left,595}, 0, 0, 0, Seq^{iTX}_{right,595}]$, for i_{TX} =1, 2, 3, 4, 5, 6, 7, 8. Note that $Seq^{iTX}_{left,595}$ and $Seq^{iTX}_{right,595}$ are defined in Table 5 and Table 6, respectively, below.

[0053] In one embodiment, for EDMG PPDU transmissions using the EDMG OFDM mode over 8.64 GHz channel, the EDMG-CEF sequence may be defined in frequency domain for i-th space-time stream as follows:

[0054] $EDMG\text{-}CEF^{iTX}_{-805,805} = [Seq^{iTX}_{left,804}, 0, 0, 0, Seq^{iTX}_{right,804}]$, for i_{TX} =1, 2, 3, 4, 5, 6, 7, 8. Note that $Seq^{iTX}_{left,804}$ and $Seq^{iTX}_{right,804}$ are defined in Table 7 and Table 8, respectively, below.

[0055] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 1 may be defined as follows:

[0056] $P_{EDMG-CEF} = [+1 \quad -1]$, $N^{N_{STS}}_{EDMG-CEF} = 2$.

[0057] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 2 may be defined as follows:

[0058] $$P_{EDMG-CEF} = \begin{bmatrix} +1 & -1 \\ +1 & +1 \end{bmatrix}, \quad N^{N_{STS}}_{EDMG-CEF} = 2.$$

[0059] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 3 may be defined as follows:

[0060] $$P_{EDMG-CEF} = \begin{bmatrix} +1 & -1 & +1 \\ +1 & -w_3^1 & w_3^2 \\ +1 & -w_3^2 & w_3^4 \end{bmatrix}, \quad w_3 = \exp(-j2\pi/3), \quad N^{N_{STS}}_{EDMG-CEF} = 3.$$

[0061] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 4 may be defined as follows:

[0062] $$P_{EDMG-CEF} = P_{4x4} = \begin{bmatrix} +1 & -1 & +1 & +1 \\ +1 & +1 & -1 & +1 \\ +1 & +1 & +1 & -1 \\ -1 & +1 & +1 & +1 \end{bmatrix}, \quad N^{N_{STS}}_{EDMG-CEF} = 4.$$

[0063] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 5, 6 may be defined as follows:

[0064] $$P_{EDMG-CEF}=\begin{bmatrix} +1 & -1 & +1 & +1 & +1 & -1 \\ +1 & -w_6^1 & w_6^2 & w_6^3 & w_6^4 & -w_6^5 \\ +1 & -w_6^2 & w_6^4 & w_6^6 & w_6^8 & -w_6^{10} \\ +1 & -w_6^3 & w_6^6 & w_6^9 & w_6^{12} & -w_6^{15} \\ +1 & -w_6^4 & w_6^8 & w_6^{12} & w_6^{16} & -w_6^{20} \\ +1 & -w_6^5 & w_6^{10} & w_6^{15} & w_6^{20} & -w_6^{25} \end{bmatrix}, w_6=\exp(-j2\pi/6), N_{EDMG-CEF}^{N_{STS}}=6$$

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[0065] In one embodiment, the EDMG-CEF mapping matrix for N_{STS} = 7, 8 may be defined as follows:

[0066] $$P_{EDMG-CEF}=\begin{bmatrix} P_{4x4} & P_{4x4} \\ P_{4x4} & -P_{4x4} \end{bmatrix}, N_{EDMG-CEF}^{N_{STS}}=8.$$

[0067] In one embodiment, the sequence pairs $Seq^{iTX}{}_{left,N}$ and $Seq^{iTX}{}_{right,N}$ of length N = 176, 385, 595, and 804 use {+1, -1, +j, -j} symbols alphabet and defined in Table 1 – Table 8.

Table 1-The sequence $Seq^{iTX}_{left,\,176}(k)$

The Sequence $Seq^{1}_{left,\,176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1
The Sequence $Seq^{2}_{left,\,176}(k)$, to be transmitted from left to right, up to down
+j -1 -1 -j +1 -1 -j +j -j -1 +j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -j +j -j -1 +j +j +1 +1 +1 +j +j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -1 +1 -1 +j +1 +1 -j -j -j +1 +1
The Sequence $Seq^{3}_{left,\,176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1
The Sequence $Seq^{4}_{left,\,176}(k)$, to be transmitted from left to right, up to down
-j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j - 1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 - j -j -j +1 +1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j - j +1 +1
The Sequence $Seq^{5}_{left,\,176}(k)$, to be transmitted from left to right, up to down

-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +j -1 -1 - j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 - j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1
The Sequence $Seq^{6}_{left, 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 - j -j -j +1 +1
The Sequence $Seq^{7}_{left, 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 -j +j -j -1 +j +j +1 +1 +1 +j +j -j +1 +1 +j -1 +1 +j -j +j +1 -j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j - 1 +1 -1 +j +1 +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j -1 +1 -1 +j +1 +1 -j -j -j +1 +1
The Sequence $Seq^{8}_{left, 176}(k)$, to be transmitted from left to right, up to down
+1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j - j -j +1 +1

Table 2-The sequence $Seq^{iTX}_{right, 176}(k)$

The Sequence $Seq^{1}_{right, 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j - 1 -1

The Sequence $Seq^{2}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
+j -1 -1 -j +1 -1 -j +j -j -1 +j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -j +j -j -1 +j +j +1 +1 +1 +j +j +j -1 -1 -j +1 -1 -j +j -j - 1 +j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{3}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{4}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
-j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j - 1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +1 +j +j -1 -j +j - 1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{5}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +j -1 -1 - j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j - 1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{6}_{right,\ 176}(k)$, to be transmitted from left to right, up to down

-1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 -1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{7}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
-1 -j -j +1 +j -j +1 -1 +1 -j -1 -j +j -j -1 +j +j +1 +1 +1 +j +j -j +1 +1 +j -1 +1 +j -j +j +1 -j -1 +1 -1 +j +1 +1 -j -j -j +1 +1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -1 -j -j +1 +j -j +1 -1 +1 -j -1 +j -j +j +1 -j -j -1 -1 -1 -j -j -j +1 +1 +j -1 +1 +j -j +j +1 -j +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 -j +j -j -1 +j +j +1 +1 +1 +j +j -1 -j -j +1 +j -j +1 -1 +1 -j -1 -j +j -j -1 +j +j +1 +1 +1 +j +j +j -1 -1 -j +1 -1 -j +j -j -1 +j +1 -1 +1 -j -1 -1 +j +j +j -1 -1
The Sequence $Seq^{8}_{right,\ 176}(k)$, to be transmitted from left to right, up to down
+1 +j +j -1 -j +j -1 +1 -1 +j +1 -1 +1 -1 +j +1 +1 -j -j -j +1 +1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 -j +1 +1 +j -1 +1 +j -j +j +1 -j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j +j -1 -1 -j +1 -1 -j +j -j -1 +j -j +j -j -1 +j +j +1 +1 +1 +j +j +j -1 -1 -j +1 -1 -j +j -j -1 +j +j -j +j +1 -j -j -1 -1 -1 -j -j -1 -j -j +1 +j -j +1 - 1 +1 -j -1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1 +1 +j +j -1 -j +j -1 +1 -1 +j +1 +1 -1 +1 -j -1 -1 +j +j +j -1 -1

Table 3-The sequence $Seq^{iTX}_{left,\ 385}(k)$

The Sequence $Seq^{1}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
+j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 - j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 - 1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j - j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 - 1 -j -1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{2}_{left,\ 385}(k)$, to be transmitted from left to right, up to down

-j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{3}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
+1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{4}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
-j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1

The Sequence $Seq^{5}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
-j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 - 1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j - j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j - 1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{6}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
-j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 - 1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{7}_{left,\ 385}(k)$, to be transmitted from left to right, up to down
+1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 - 1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j - j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 - 1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j

-1 -1 +1 +1 -1 -j -1
The Sequence $Seq^{8}_{left, 385}(k)$, to be transmitted from left to right, up to down
+j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j - 1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j - 1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1

Table 4-The sequence $Seq^{iTX}_{right, 385}(k)$

The Sequence $Seq^{1}_{right, 385}(k)$, to be transmitted from left to right, up to down
+j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j - 1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 - j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 - j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j
The Sequence $Seq^{2}_{right, 385}(k)$, to be transmitted from left to right, up to down
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 - 1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j - j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1

-1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1

The Sequence $Seq^{3}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j -1 +j +j -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j
The Sequence $Seq^{4}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
-j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 -1 +1 +j +1 -j
The Sequence $Seq^{5}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -

1 -1 +1 +j +1 -1
The Sequence $Seq^{6}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
+j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j - j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1
The Sequence $Seq^{7}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1
The Sequence $Seq^{8}_{right,\ 385}(k)$, to be transmitted from left to right, up to down
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j - j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j - j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 - 1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1

+j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j

Table 5-The sequence $Seq^{iTX}_{left,595}(k)$

The Sequence $Seq^{1}_{left,595}(k)$, to be transmitted from left to right, up to down
-1 +1 -1 -1 -1 -j -j -1 -j -1 -1 +j -j -j -j +1 -j -j +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j - j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{2}_{left,595}(k)$, to be transmitted from left to right, up to down
-j -j -1 +j +1 -j -1 +1 +j +1 +j +1 +j -1 -j -1 -1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 - 1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 - 1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 - 1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 - j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{3}_{left,595}(k)$, to be transmitted from left to right, up to down

+j +1 -1 -j +j +j -j -1 -1 +1 +j -j -1 +j -j -j +1 -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 - 1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{4}_{left,\ 595}(k)$, to be transmitted from left to right, up to down
-j +j +1 +j -1 +1 +1 -1 +1 -j +1 +j -1 -1 +j +j +1 +1 +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 - j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j - 1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{5}_{left,\ 595}(k)$, to be transmitted from left to right, up to down

+j -1 -j -1 -j +j +j -1 +j -1 -1 +1 -j +1 +1 -1 -1 -j -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j - 1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 - 1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j - 1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j - j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{6}_{left, 595}(k)$, to be transmitted from left to right, up to down
+1 +j +j +j -j -j -1 -1 -1 +j +j -j +j +j +1 -1 -j +j -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 - 1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 - 1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{7}_{left, 595}(k)$, to be transmitted from left to right, up to down
+1 -1 +j +1 +1 -j +1 +j -1 -1 -1 -1 +1 +1 +1 -1 -1 +j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -

1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 - 1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j - j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 - j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j - j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
The Sequence $Seq^{8}_{left,\ 595}(k)$, to be transmitted from left to right, up to down
-j -j +1 +1 -1 -j -j +j -j +1 -j -1 +j -j -1 -1 -j -j +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 - 1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j - 1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j - 1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1

Table 6-The sequence $Seq^{iTX}_{right,\ 595}(k)$

The Sequence $Seq^{1}_{right,\ 595}(k)$, to be transmitted from left to right, up to down
-j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 - 1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j

-1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 - 1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +j -1 +j +j +j +1 -1 +1 -j +1 -1 -1 -1 +1 -1 -1 +1
The Sequence $Seq^{2}_{right,\ 595}(k)$, to be transmitted from left to right, up to down
-1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 - 1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 - 1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 +j +j +j +1 -1 +1 +j -1 -j +1 -1 +1 +1 -1 +1 -j +1 -1
The Sequence $Seq^{3}_{right,\ 595}(k)$, to be transmitted from left to right, up to down
+j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1

+1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1
+1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j
+j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -
1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j
+1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j
+j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1
-1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j
+j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1
-1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j
+1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1
+1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j
+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j
-j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j
+1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j -j +j -j +j +j
+j -j +1 +1 +1 -j +1 +j +1 +j

The Sequence $Seq^4_{right, 595}(k)$, to be transmitted from left to right, up to down
-j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 - j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 - 1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 - 1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 +1 +1 -1 -j +1 -j -1 +1 -j -j -1 +1 -1 -1 +1 +j -1
The Sequence $Seq^5_{right, 595}(k)$, to be transmitted from left to right, up to down
-1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 - 1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 - 1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j -1 -j -j -j -1 +1 -j +j +j -j +j +j -j -1 +j +j -j
The Sequence $Seq^6_{right, 595}(k)$, to be transmitted from left to right, up to down

+1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 -1 +1 +1 -1 +j -j -1 +1 +1 -j -j -1 -j -j +j -j -j +j
The Sequence $Seq^{7}_{right,\ 595}(k)$, to be transmitted from left to right, up to down
+j -j -j -j +1 -j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j -j +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 -1 +1 +1 -1 +j -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -1 -1 +1 +1 -1 +j -j -1 +1 +1 -j -j -1 -j -j +j -j -j +j
The Sequence $Seq^{8}_{right,\ 595}(k)$, to be transmitted from left to right, up to down
-1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 +j -j -j -j +1 -j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 +j +j -j -1 +j +1 +j -j +1 -1 +1 +1 -j +1 +1 -j -1 +1

+j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j -1 +1 +1 +1 +j +1 -1 +1 +1 -1 -j -1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j - j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 -j +j +j +j -1 +j -j +j +j -j +1 -j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 -1 +1 +1 +1 +j +1 +1 -1 -1 +1 +j +1 +j -j -j -j +1 -j +j -j -j +j -1 +j +j -j -j -j +1 -j -j +j +j -j +1 -j +j -j -j -j +1 -j +j -j -j +j -1 +j -j +j +j +j -1 +j +j -j -j +j -1 +j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +j +j +j -1 +j -j +j +j -j +1 -j +j -j -j -j +1 -j -j +j +j -j +1 -j +1 -1 -1 -1 -j -1 +1 -1 -1 +1 +j +1 +1 -1 -1 -1 -j -1 -1 +1 +1 -1 -j -1 -j +1 -j +j -1 -1 +j +j +1 +j +1 -1 +1 +j +1 +1 +j -j +j

Table 7-The sequence $Seq^{iTX}_{left,\,804}(k)$

The Sequence $Seq^{1}_{left,\,804}(k)$, to be transmitted from left to right, up to down
-1 -j -1 +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j - 1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 - 1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1
The Sequence $Seq^{2}_{left,\,804}(k)$, to be transmitted from left to right, up to down

-1 -1 +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j - 1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j - j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j - j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j - j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 - j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 - j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j - 1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j - j -1 +1 -1 +j +1 +1 +j -1
The Sequence $Seq^{3}_{left,\ 804}(k)$, to be transmitted from left to right, up to down
+j +1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 - j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j - 1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j

+1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1
+1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1
+1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j
+j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j
+1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1
-j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1
-j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1

The Sequence $Seq^{4}_{left, 804}(k)$, to be transmitted from left to right, up to down
-j +j +1 +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 - 1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j - 1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 - 1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j - j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1

The Sequence $Seq^{5}_{left, 804}(k)$, to be transmitted from left to right, up to down
+1 +j -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j - j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j

+1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 - 1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j - 1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j - 1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1
The Sequence $Seq^{6}_{left,\ 804}(k)$, to be transmitted from left to right, up to down
+1 -j +j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j - j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 - 1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j - 1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j - 1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j - j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1
The Sequence $Seq^{7}_{left,\ 804}(k)$, to be transmitted from left to right, up to down
-1 +j +1 -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j - 1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j

-1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 - 1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 - 1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 - 1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1
The Sequence $Seq^{8}_{left, 804}(k)$, to be transmitted from left to right, up to down
+j -j +j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j - 1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 - 1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j - 1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j - j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j - j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j - j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 - j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j - j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1

Table 8-The sequence $Seq^{iTX}_{right, 804}(k)$

The Sequence $Seq^1_{right, 804}(k)$, to be transmitted from left to right, up to down
+j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j - 1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j - 1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j - j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j - j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 - 1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 -1 -j +j
The Sequence $Seq^2_{right, 804}(k)$, to be transmitted from left to right, up to down
+1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1

+1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1
-j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j
-j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j
+1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1
+1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1
+1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -
1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j
+1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j
+j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1
+1 -1 +j +1 +1 +j -1 -j +1 +1 +j

The Sequence $Seq^{3}_{right, 804}(k)$, to be transmitted from left to right, up to down
+1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 - j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 - 1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -j - j -1 +1 -1 +j +1 +1 +j -1 +j -j +j -1

The Sequence $Seq^{4}_{right, 804}(k)$, to be transmitted from left to right, up to down
+1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 - 1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j - 1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1

+j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 - j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 - 1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -j +j -j
The Sequence $Seq^{5}_{right,\ 804}(k)$, to be transmitted from left to right, up to down
+j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 - 1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j - j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j -j +j +1
The Sequence $Seq^{6}_{right,\ 804}(k)$, to be transmitted from left to right, up to down
+1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1

+1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1
-j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j
+1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1
+j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1
+1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -
1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1
-j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -
j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j
+1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -1 -1
+j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j
-j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1
+1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j -j -1 +1 -1 +j +1
+1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 -j
-j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1
+j +j -1 -j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +1 +1 -j +j -j -1 +j +j -1 -j +1
+1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -j -j -1 +1 -1
+j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -
j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +j +j +1 -1 +1 -j -1 -1 -j +1 +1
+1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +1 +1 -j +j -j -1
+j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -1 -
1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -
1 -1 -j +1 -j -j -1 +1 -1 +j +1 +1 +j -1 +1 -j +1 +1

The Sequence $Seq^{7}_{right, 804}(k)$, to be transmitted from left to right, up to down

+1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -
j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -
j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1
-1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j
+1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j
-j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1
+1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1
-j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1
+1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1
-1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +1 +1
-j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1
+1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -
1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j
-1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j
+j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1
+j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1
+j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1
+1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j
+j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1
+j -j +j +1 -j -j +1 +j +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -
j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1

+1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -j
The Sequence $Seq^8_{right,\ 804}(k)$, to be transmitted from left to right, up to down
-j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j - 1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j - 1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j - 1 -1 -j +1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j - 1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 - 1 -j +1 -j -j -1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 - 1 +j -j +j +1 -j -j +1 +j +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j +j +j +1 -1 +1 +j +1 +1 +j -1 -1 -1 +j -j +j +1 -j -j +1 +j -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 -1 +1 -j -1 -1 -j +1 +1 +1 -j +j -j +1 -j -j +1 +j +j +j +1 -1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j +j +j +1 - 1 +1 -j -1 -1 -j +1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j -1 +1 -1 +j +1 +1 +j -1 +j +j +1 -1 +1 +j +1 +1 +j -1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j -j -j - 1 +1 -1 -j -1 -1 -j +1 -1 -1 +j -j +j +1 -j -j +1 +j -j -j -1 +1 -1 -j -1 -1 -j +1 +1 +1 -j +j -j -1 +j +j -1 -j +1 +1 -j +j -j +1 -j -j +1 +j -j -j -1 +1 -1 +j +1 +1 +j -1 -1 -1 +j -j +j -1 +j +j -1 -j -j -j - 1 +1 -1 +j +1 +1 +j -1 -1 +j -1 -j

[0068] FIG. 2 illustrates a flow diagram of illustrative process 200 for an illustrative EDMG OFDM TRN unit definition system, in accordance with one or more example embodiments of the present disclosure.

[0069] At block 202, a device (e.g., the user device(s) 120 and/or the AP 102 of FIG. 1) may determine one or more transmit chains of the device. The device may comprise a transceiver configured to transmit and receive wireless signals. The device may comprise one or more antennas coupled to the transceiver.

[0070] At block 204, the device may determine one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains. The one or more TRN units may be enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

[0071] At block 206, the device may determine one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units. The one or more sequences may include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit. The first sequence may be orthogonal to the second sequence. The one or more sequences in the frequency domain may be determined based on a conversion from a time domain. The one or more sequences may be based at least in part on one or more of a channel bonding factor or a number of spatial streams.

[0072] At block 208, the device may cause to send a physical layer (PHY) frame to a first device comprising the one or more TRN units. The device may identify a response frame from the second device comprising feedback regarding the one or more TRN units.

[0073] It is understood that the above descriptions are for purposes of illustration and are not meant to be limiting.

[0074] FIG. 3 shows a functional diagram of an exemplary communication station 300 in accordance with some embodiments. In one embodiment, FIG. 3 illustrates a functional block diagram of a communication station that may be suitable for use as an AP 102 (FIG. 1) or user device 120 (FIG. 1) in accordance with some embodiments. The communication station 300 may also be suitable for use as a handheld device, a mobile device, a cellular telephone, a smartphone, a tablet, a netbook, a wireless terminal, a laptop computer, a wearable computer device, a femtocell, a high data rate (HDR) subscriber station, an access point, an access terminal, or other personal communication system (PCS) device.

[0075] The communication station 300 may include communications circuitry 302 and a transceiver 310 for transmitting and receiving signals to and from other communication stations using one or more antennas 301. The transceiver 310 may be a device comprising both a transmitter and a receiver that are combined and share common circuitry (e.g., communication circuitry 302). The communication circuitry 302 may include amplifiers, filters, mixers, analog to digital and/or digital to analog converters. The transceiver 310 may transmit and receive analog or digital signals. The transceiver 310 may allow reception of signals during transmission periods. This mode is known as full-duplex, and may require the transmitter and receiver to operate on different frequencies to minimize interference between the transmitted signal and the received signal. The transceiver 310 may operate in a half-duplex mode, where the transceiver 310 may transmit or receive signals in one direction at a time.

[0076] The communications circuitry 302 may include circuitry that can operate the physical layer (PHY) communications and/or media access control (MAC) communications for controlling access to the wireless medium, and/or any other communications layers for transmitting and receiving signals. The communication station 300 may also include processing circuitry 306 and memory 308 arranged to perform the operations described herein. In some embodiments, the communications circuitry 302 and the processing circuitry 306 may be configured to perform operations detailed in detailed in FIGs. 2-3.

[0077] In accordance with some embodiments, the communications circuitry 302 may be arranged to contend for a wireless medium and configure frames or packets for communicating over the wireless medium. The communications circuitry 302 may be arranged to transmit and receive signals. The communications circuitry 302 may also include circuitry for modulation/demodulation, upconversion/downconversion, filtering, amplification, etc. In some embodiments, the processing circuitry 306 of the communication station 300 may include one or more processors. In other embodiments, two or more antennas 301 may be coupled to the communications circuitry 302 arranged for sending and receiving signals. The memory 308 may store information for configuring the processing circuitry 306 to perform operations for configuring and transmitting message frames and performing the various operations described herein. The memory 308 may include any type of memory, including non-transitory memory, for storing information in a form readable by a machine (e.g., a computer). For example, the memory 308 may include a computer-readable storage

device, read-only memory (ROM), random-access memory (RAM), magnetic disk storage media, optical storage media, flash-memory devices and other storage devices and media.

[0078] In some embodiments, the communication station 300 may be part of a portable wireless communication device, such as a personal digital assistant (PDA), a laptop or portable computer with wireless communication capability, a web tablet, a wireless telephone, a smartphone, a wireless headset, a pager, an instant messaging device, a digital camera, an access point, a television, a medical device (e.g., a heart rate monitor, a blood pressure monitor, etc.), a wearable computer device, or another device that may receive and/or transmit information wirelessly.

[0079] In some embodiments, the communication station 300 may include one or more antennas 301. The antennas 301 may include one or more directional or omnidirectional antennas, including, for example, dipole antennas, monopole antennas, patch antennas, loop antennas, microstrip antennas, or other types of antennas suitable for transmission of RF signals. In some embodiments, instead of two or more antennas, a single antenna with multiple apertures may be used. In these embodiments, each aperture may be considered a separate antenna. In some multiple-input multiple-output (MIMO) embodiments, the antennas may be effectively separated for spatial diversity and the different channel characteristics that may result between each of the antennas and the antennas of a transmitting station.

[0080] In some embodiments, the communication station 300 may include one or more of a keyboard, a display, a non-volatile memory port, multiple antennas, a graphics processor, an application processor, speakers, and other mobile device elements. The display may be an LCD screen including a touch screen.

[0081] Although the communication station 300 is illustrated as having several separate functional elements, two or more of the functional elements may be combined and may be implemented by combinations of software-configured elements, such as processing elements including digital signal processors (DSPs), and/or other hardware elements. For example, some elements may include one or more microprocessors, DSPs, field-programmable gate arrays (FPGAs), application specific integrated circuits (ASICs), radio-frequency integrated circuits (RFICs) and combinations of various hardware and logic circuitry for performing at least the functions described herein. In some embodiments, the functional elements of the communication station 300 may refer to one or more processes operating on one or more

processing elements.

[0082] Certain embodiments may be implemented in one or a combination of hardware, firmware, and software. Other embodiments may also be implemented as instructions stored on a computer-readable storage device, which may be read and executed by at least one processor to perform the operations described herein. A computer-readable storage device may include any non-transitory memory mechanism for storing information in a form readable by a machine (e.g., a computer). For example, a computer-readable storage device may include read-only memory (ROM), random-access memory (RAM), magnetic disk storage media, optical storage media, flash-memory devices, and other storage devices and media. In some embodiments, the communication station 300 may include one or more processors and may be configured with instructions stored on a computer-readable storage device memory.

[0083] FIG. 4 illustrates a block diagram of an example of a machine 400 or system upon which any one or more of the techniques (e.g., methodologies) discussed herein may be performed. In other embodiments, the machine 400 may operate as a standalone device or may be connected (e.g., networked) to other machines. In a networked deployment, the machine 400 may operate in the capacity of a server machine, a client machine, or both in server-client network environments. In an example, the machine 400 may act as a peer machine in peer-to-peer (P2P) (or other distributed) network environments. The machine 400 may be a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a mobile telephone, a wearable computer device, a web appliance, a network router, a switch or bridge, or any machine capable of executing instructions (sequential or otherwise) that specify actions to be taken by that machine, such as a base station. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions to perform any one or more of the methodologies discussed herein, such as cloud computing, software as a service (SaaS), or other computer cluster configurations.

[0084] Examples, as described herein, may include or may operate on logic or a number of components, modules, or mechanisms. Modules are tangible entities (e.g., hardware) capable of performing specified operations when operating. A module includes hardware. In an example, the hardware may be specifically configured to carry out a specific operation (e.g., hardwired). In another example, the hardware may include configurable execution units

(e.g., transistors, circuits, etc.) and a computer-readable medium containing instructions where the instructions configure the execution units to carry out a specific operation when in operation. The configuring may occur under the direction of the executions units or a loading mechanism. Accordingly, the execution units are communicatively coupled to the computer-readable medium when the device is operating. In this example, the execution units may be a member of more than one module. For example, under operation, the execution units may be configured by a first set of instructions to implement a first module at one point in time and reconfigured by a second set of instructions to implement a second module at a second point in time.

[0085] The machine (e.g., computer system) 400 may include a hardware processor 402 (e.g., a central processing unit (CPU), a graphics processing unit (GPU), a hardware processor core, or any combination thereof), a main memory 404 and a static memory 406, some or all of which may communicate with each other via an interlink (e.g., bus) 408. The machine 400 may further include a power management device 432, a graphics display device 410, an alphanumeric input device 412 (e.g., a keyboard), and a user interface (UI) navigation device 414 (e.g., a mouse). In an example, the graphics display device 410, alphanumeric input device 412, and UI navigation device 414 may be a touch screen display. The machine 400 may additionally include a storage device (i.e., drive unit) 416, a signal generation device 418 (e.g., a speaker), an EDMG OFDM TRN unit definition device 419, a network interface device/transceiver 420 coupled to antenna(s) 430, and one or more sensors 428, such as a global positioning system (GPS) sensor, a compass, an accelerometer, or other sensor. The machine 400 may include an output controller 434, such as a serial (e.g., universal serial bus (USB), parallel, or other wired or wireless (e.g., infrared (IR), near field communication (NFC), etc.) connection to communicate with or control one or more peripheral devices (e.g., a printer, a card reader, etc.)).

[0086] The storage device 416 may include a machine-readable medium 422 on which is stored one or more sets of data structures or instructions 424 (e.g., software) embodying or utilized by any one or more of the techniques or functions described herein. The instructions 424 may also reside, completely or at least partially, within the main memory 404, within the static memory 406, or within the hardware processor 402 during execution thereof by the machine 400. In an example, one or any combination of the hardware processor 402, the main memory 404, the static memory 406, or the storage device 416 may constitute machine-

readable media.

[0087] The EDMG OFDM TRN unit definition device 419 may carry out or perform any of the operations and processes (e.g., process 200) described and shown above.

[0088] In one embodiment, the EDMG OFDM TRN unit definition device 419 may define TRN units for EDMG OFDM physical layer (PHY). The TRN units may be defined in the frequency domain per transmit chain using a sequence set. The number of different sequences in the set may be equal to the number of transmit chains. The TRNs may be defined for different channel bonding factors, N_{CB} = 1, 2, 3, and 4.

[0089] In one embodiment, the EDMG OFDM TRN unit definition device 419 may include a TRN unit in a PHY packet. For example, a TRN unit may be appended to the end of a PHY packet. The TRN unit may be used to perform one or more training operations. The TRN unit definition may depend on one or more of a number of transmit chains of a device and/or a channel bonding factor. The 802.11ay specification defines a number of channel frequencies associated with the different channel bonding factors, N_{CB} = 1, 2, 3, and 4. For example, channel bonding factor 1 may correspond to a 2.16 GHz channel. Channel bonding factor 2 may correspond to a 4.32 GHz channel. Channel bonding factor 3 may correspond to a 6.48 GHz channel. Channel bonding factor 4 may correspond to a 8.64 GHz channel.

[0090] In one embodiment, the EDMG OFDM TRN unit definition device 419 may define a TRN unit per transmit chain of a device. A sequence of a TRN unit may be different for each transmit chain. The sequence may be defined in the frequency domain using an alphabet comprising {+1, -1, +j, -j} (e.g., positive and negative real and complex unit numbers). A number of different sequences may be equal to a number of different transmit chains. Note that the TRN sequence may be different for different TRN channel bonding factors.

[0091] In one embodiment, the EDMG OFDM TRN unit definition device 419 may define a TRN waveform in the time domain. The TRN unit may be a function of an inverse discrete Fourier transform applied for the sequence, wherein the sequence may be defined as EDMG-CEF_k^{iTX}. The EDMG-CEF sequence may be defined in the frequency domain for each transmit chain and a channel bonding factor. In other words, for a given transmit chain of a plurality of transmit chains of a device and for a given channel bonding factor, a EDMG-CEF sequence may be obtained, wherein the EDMG-CEF sequence is defined in the frequency domain. A TRN unit may be defined in the time domain by applying an inverse

discrete Fourier transform to the EDMG-CEF sequence. In other words, the EDMG-CEF sequence may be converted from the frequency domain to the time domain by application of the inverse discrete Fourier transform.

[0092] In one embodiment, the EDMG OFDM TRN unit definition device 419 may define the TRN unit as a function of a number of active tones, a window function, a EDMG-CEF mapping matrix, a EDMG-CEF sequence, and an exponential term. For example, the TRN unit may be equal to an inverse of the square root of a number of active tones times a window function times a summation of an EDMG-CEF mapping matrix times a sequence times an exponential function.

[0093] In one embodiment, the EDMG OFDM TRN unit definition device 419 may determine the number of active tones as being equal to a number of occupied subcarriers less a number of pilot tones. The window function may be a function that may be applied to smooth a transition between consecutive ODMF symbols. The window function may be implementation specific. In other words, the window function may be a function that has a value of zero outside of a set interval.

[0094] In one embodiment, the EDMG OFDM TRN unit definition device 419 may determine that the summation of the EDMG-CEF mapping matrix may be a summation from a negative of the number of subcarriers ($-N_{SR}$) to a positive of the number of subcarriers (N_{SR}). The mapping matrix that is summed may be defined depending on a number of spatial streams (N_{STS}). In other words, for a given number of spatial streams (e.g., N_{STS} = 1, 2, 3, 4, 5, 6, 7, or 8), a mapping matrix may be obtained and summed from $-N_{SR}$ to N_{SR}. The mapping matrix may have a number of rows that is equal to a number of transmit chains and a number of columns that is equal to a number of spatial time streams.

[0095] In one embodiment, the EDMG OFDM TRN unit definition device 419 may define the EDMG-CEF sequence in the frequency domain and may be a function of a channel bonding factor and a transmit chain index value. The EDMG-CEF sequence may include sequence pairs $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$, wherein the length N of the sequence pairs depends on a channel bonding factor. In other words, each of $Seq^{iTX}_{left,N}$ and $Seq^{iTX}_{right,N}$ may be defined based on a transmit chain index value and a channel bonding factor. The EDMG-CEF may be defined as $Seq^{iTX}_{left,N}$, 0, 0, 0, $Seq^{iTX}_{right,N}$.

[0096] In one embodiment, the EDMG OFDM TRN unit definition device 419 may determine the exponential term as a function of a sample time duration T_s and a guard

interval T_{GI}. The sample time duration may be equal to the inverse of the sample frequency F_s. The guard interval may be a long guard interval, wherein the long guard interval may be equal to 72 nanoseconds (ns).

[0097] In one embodiment, after a PHY packet that includes the TRN unit has been sent by the EDMG OFDM TRN unit definition device 419 to a receiving device, the EDMG OFDM TRN unit definition device 419 may receive feedback from the receiving device. The EDMG OFDM TRN unit definition device 419 may modify one or more settings based at least in part on the feedback from the receiving device.

[0098] It is understood that the above are only a subset of what the EDMG OFDM TRN unit definition device 419 may be configured to perform and that other functions included throughout this disclosure may also be performed by the EDMG OFDM TRN unit definition device 419.

[0001] While the machine-readable medium 422 is illustrated as a single medium, the term "machine-readable medium" may include a single medium or multiple media (e.g., a centralized or distributed database, and/or associated caches and servers) configured to store the one or more instructions 424.

[0099] Various embodiments may be implemented fully or partially in software and/or firmware. This software and/or firmware may take the form of instructions contained in or on a non-transitory computer-readable storage medium. Those instructions may then be read and executed by one or more processors to enable performance of the operations described herein. The instructions may be in any suitable form, such as but not limited to source code, compiled code, interpreted code, executable code, static code, dynamic code, and the like. Such a computer-readable medium may include any tangible non-transitory medium for storing information in a form readable by one or more computers, such as but not limited to read-only memory (ROM); random-access memory (RAM); magnetic disk storage media; optical storage media; a flash-memory, etc.

[0100] The term “machine-readable medium” may include any medium that is capable of storing, encoding, or carrying instructions for execution by the machine 400 and that cause the machine 400 to perform any one or more of the techniques of the present disclosure, or that is capable of storing, encoding, or carrying data structures used by or associated with such instructions. Non-limiting machine-readable medium examples may include solid-state memories and optical and magnetic media. In an example, a massed machine-readable

medium includes a machine-readable medium with a plurality of particles having resting mass. Specific examples of massed machine-readable media may include non-volatile memory, such as semiconductor memory devices (e.g., electrically programmable read-only memory (EPROM), or electrically erasable programmable read-only memory (EEPROM)) and flash-memory devices; magnetic disks, such as internal hard disks and removable disks; magneto-optical disks; and CD-ROM and DVD-ROM disks.

[0101] The instructions 424 may further be transmitted or received over a communications network 426 using a transmission medium via the network interface device/transceiver 420 utilizing any one of a number of transfer protocols (e.g., frame relay, internet protocol (IP), transmission control protocol (TCP), user datagram protocol (UDP), hypertext transfer protocol (HTTP), etc.). Example communications networks may include a local area network (LAN), a wide area network (WAN), a packet data network (e.g., the Internet), mobile telephone networks (e.g., cellular networks), plain old telephone (POTS) networks, wireless data networks (e.g., Institute of Electrical and Electronics Engineers (IEEE) 802.11 family of standards known as Wi-Fi®, IEEE 802.16 family of standards known as WiMax®), IEEE 802.15.4 family of standards, and peer-to-peer (P2P) networks, among others. In an example, the network interface device/transceiver 420 may include one or more physical jacks (e.g., Ethernet, coaxial, or phone jacks) or one or more antennas to connect to the communications network 426. In an example, the network interface device/transceiver 420 may include a plurality of antennas to wirelessly communicate using at least one of single-input multiple-output (SIMO), multiple-input multiple-output (MIMO), or multiple-input single-output (MISO) techniques. The term "transmission medium" shall be taken to include any intangible medium that is capable of storing, encoding, or carrying instructions for execution by the machine 400 and includes digital or analog communications signals or other intangible media to facilitate communication of such software. The operations and processes described and shown above may be carried out or performed in any suitable order as desired in various implementations. Additionally, in certain implementations, at least a portion of the operations may be carried out in parallel. Furthermore, in certain implementations, less than or more than the operations described may be performed.

[0102] The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment described herein as "exemplary" is not necessarily to be

construed as preferred or advantageous over other embodiments. The terms "computing device," "user device," "communication station," "station," "handheld device," "mobile device," "wireless device" and "user equipment" (UE) as used herein refers to a wireless communication device such as a cellular telephone, a smartphone, a tablet, a netbook, a wireless terminal, a laptop computer, a femtocell, a high data rate (HDR) subscriber station, an access point, a printer, a point of sale device, an access terminal, or other personal communication system (PCS) device. The device may be either mobile or stationary.

[0103] As used within this document, the term "communicate" is intended to include transmitting, or receiving, or both transmitting and receiving. This may be particularly useful in claims when describing the organization of data that is being transmitted by one device and received by another, but only the functionality of one of those devices is required to infringe the claim. Similarly, the bidirectional exchange of data between two devices (both devices transmit and receive during the exchange) may be described as "communicating," when only the functionality of one of those devices is being claimed. The term "communicating" as used herein with respect to a wireless communication signal includes transmitting the wireless communication signal and/or receiving the wireless communication signal. For example, a wireless communication unit, which is capable of communicating a wireless communication signal, may include a wireless transmitter to transmit the wireless communication signal to at least one other wireless communication unit, and/or a wireless communication receiver to receive the wireless communication signal from at least one other wireless communication unit.

[0104] As used herein, unless otherwise specified, the use of the ordinal adjectives "first," "second," "third," etc., to describe a common object, merely indicates that different instances of like objects are being referred to and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking, or in any other manner.

[0105] The term "access point" (AP) as used herein may be a fixed station. An access point may also be referred to as an access node, a base station, an evolved node B (eNodeB), or some other similar terminology known in the art. An access terminal may also be called a mobile station, user equipment (UE), a wireless communication device, or some other similar terminology known in the art. Embodiments disclosed herein generally pertain to wireless

networks. Some embodiments may relate to wireless networks that operate in accordance with one of the IEEE 802.11 standards.

[0106] Some embodiments may be used in conjunction with various devices and systems, for example, a personal computer (PC), a desktop computer, a mobile computer, a laptop computer, a notebook computer, a tablet computer, a server computer, a handheld computer, a handheld device, a personal digital assistant (PDA) device, a handheld PDA device, an on-board device, an off-board device, a hybrid device, a vehicular device, a non-vehicular device, a mobile or portable device, a consumer device, a non-mobile or non-portable device, a wireless communication station, a wireless communication device, a wireless access point (AP), a wired or wireless router, a wired or wireless modem, a video device, an audio device, an audio-video (A/V) device, a wired or wireless network, a wireless area network, a wireless video area network (WVAN), a local area network (LAN), a wireless LAN (WLAN), a personal area network (PAN), a wireless PAN (WPAN), and the like.

[0107] Some embodiments may be used in conjunction with one way and/or two-way radio communication systems, cellular radio-telephone communication systems, a mobile phone, a cellular telephone, a wireless telephone, a personal communication system (PCS) device, a PDA device which incorporates a wireless communication device, a mobile or portable global positioning system (GPS) device, a device which incorporates a GPS receiver or transceiver or chip, a device which incorporates an RFID element or chip, a multiple input multiple output (MIMO) transceiver or device, a single input multiple output (SIMO) transceiver or device, a multiple input single output (MISO) transceiver or device, a single input single output (SISO) transceiver or device, a device having one or more internal antennas and/or external antennas, digital video broadcast (DVB) devices or systems, multi-standard radio devices or systems, a wired or wireless handheld device, e.g., a smartphone, a wireless application protocol (WAP) device, or the like.

[0108] Some embodiments may be used in conjunction with one or more types of wireless communication signals and/or systems following one or more wireless communication protocols, for example, radio frequency (RF), infrared (IR), frequency-division multiplexing (FDM), orthogonal FDM (OFDM), time-division multiplexing (TDM), time-division multiple access (TDMA), extended TDMA (E-TDMA), general packet radio service (GPRS), extended GPRS, code-division multiple access (CDMA), wideband CDMA (WCDMA), CDMA 2000, single-carrier CDMA, multi-carrier CDMA, multi-carrier

modulation (MDM), discrete multi-tone (DMT), Bluetooth®, global positioning system (GPS), Wi-Fi, Wi-Max, ZigBee, ultra-wideband (UWB), global system for mobile communications (GSM), 2G, 2.5G, 3G, 3.5G, 4G, fifth generation (5G) mobile networks, 3GPP, long term evolution (LTE), LTE advanced, enhanced data rates for GSM Evolution (EDGE), or the like. Other embodiments may be used in various other devices, systems, and/or networks.

[0109] The following example pertain to further embodiments.

[0110] Example 1 may include a device, the device comprising: storage and processing circuitry, configured to: determine one or more transmit chains of the device; determine one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains; determine one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and cause to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

[0111] Example 2 may include the device of example 1 and/or some other example herein, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

[0112] Example 3 may include the device of example 1 and/or some other example herein, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

[0113] Example 4 may include the device of example 1 and/or some other example herein, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

[0114] Example 5 may include the device of example 1 and/or some other example herein, wherein the storage and processing circuitry are further configured to identify a response frame from the second device comprising feedback regarding the one or more TRN units.

[0115] Example 6 may include the device of example 1 and/or some other example herein, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

[0116] Example 7 may include the device of example 1 and/or some other example herein, further comprising a transceiver configured to transmit and receive wireless signals.

[0117] Example 8 may include the device of example 7 and/or some other example herein, further comprising one or more antennas coupled to the transceiver.

[0118] Example 9 may include a non-transitory computer-readable medium storing computer-executable instructions which when executed by one or more processors result in performing operations comprising: determining one or more transmit chains of the device; determining one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains; determining one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and causing to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

[0119] Example 10 may include the non-transitory computer-readable medium of example 9 and/or some other example herein, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

[0120] Example 11 may include the non-transitory computer-readable medium of example 9 and/or some other example herein, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

[0121] Example 12 may include the non-transitory computer-readable medium of example 9 and/or some other example herein, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

[0122] Example 13 may include the non-transitory computer-readable medium of example 9 and/or some other example herein, wherein the operations further comprise identifying a response frame from the second device comprising feedback regarding the one or more TRN units.

[0123] Example 14 may include the non-transitory computer-readable medium of example 9 and/or some other example herein, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

[0124] Example 15 may include a method comprising: determining, by one or more processors, one or more transmit chains of the device; determining, by the one or more

processors, one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains; determining, by the one or more processors, one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and causing to send, by the one or more processors, a physical layer (PHY) frame to a first device comprising the one or more TRN units.

[0125] Example 16 may include the method of example 15 and/or some other example herein, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

[0126] Example 17 may include the method of example 15 and/or some other example herein, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

[0127] Example 18 may include the method of example 15 and/or some other example herein, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

[0128] Example 19 may include the method of example 15 and/or some other example herein, further comprising identifying, by the one or more processors, a response frame from the second device comprising feedback regarding the one or more TRN units.

[0129] Example 20 may include the method of example 15 and/or some other example herein, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

[0130] Example 21 may include an apparatus comprising: means for determining one or more transmit chains of the device; means for determining one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains; means for determining one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and means for causing to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

[0131] Example 22 may include the apparatus of example 21 and/or some other example herein, wherein the one or more sequences include a first sequence corresponding to a first

TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

[0132] Example 23 may include the apparatus of example 21 and/or some other example herein, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

[0133] Example 24 may include the apparatus of example 21 and/or some other example herein, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

[0134] Example 25 may include the apparatus of example 21 and/or some other example herein, further comprising means for identifying a response frame from the second device comprising feedback regarding the one or more TRN units.

[0135] Example 26 may include one or more non-transitory computer-readable media comprising instructions to cause an electronic device, upon execution of the instructions by one or more processors of the electronic device, to perform one or more elements of a method described in or related to any of examples 1-25, or any other method or process described herein

[0136] Example 27 may include an apparatus comprising logic, modules, and/or circuitry to perform one or more elements of a method described in or related to any of examples 1-25, or any other method or process described herein.

[0137] Example 28 may include a method, technique, or process as described in or related to any of examples 1-25, or portions or parts thereof.

[0138] Example 29 may include an apparatus comprising: one or more processors and one or more computer readable media comprising instructions that, when executed by the one or more processors, cause the one or more processors to perform the method, techniques, or process as described in or related to any of examples 1-25, or portions thereof.

[0139] Example 30 may include a method of communicating in a wireless network as shown and described herein.

[0140] Example 31 may include a system for providing wireless communication as shown and described herein.

[0141] Example 32 may include a device for providing wireless communication as shown and described herein.

[0142] Embodiments according to the disclosure are in particular disclosed in the attached claims directed to a method, a storage medium, a device and a computer program product, wherein any feature mentioned in one claim category (e.g., method) can be claimed in another claim category (e.g., system) as well. The dependencies or references back in the attached claims are chosen for formal reasons only. However, any subject matter resulting from a deliberate reference back to any previous claims (in particular multiple dependencies) can be claimed as well, so that any combination of claims and the features thereof are disclosed and can be claimed regardless of the dependencies chosen in the attached claims. The subject-matter which can be claimed comprises not only the combinations of features as set out in the attached claims but also any other combination of features in the claims, wherein each feature mentioned in the claims can be combined with any other feature or combination of other features in the claims. Furthermore, any of the embodiments and features described or depicted herein can be claimed in a separate claim and/or in any combination with any embodiment or feature described or depicted herein or with any of the features of the attached claims.

[0143] The foregoing description of one or more implementations provides illustration and description, but is not intended to be exhaustive or to limit the scope of embodiments to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practice of various embodiments.

[0144] Certain aspects of the disclosure are described above with reference to block and flow diagrams of systems, methods, apparatuses, and/or computer program products according to various implementations. It will be understood that one or more blocks of the block diagrams and flow diagrams, and combinations of blocks in the block diagrams and the flow diagrams, respectively, may be implemented by computer-executable program instructions. Likewise, some blocks of the block diagrams and flow diagrams may not necessarily need to be performed in the order presented, or may not necessarily need to be performed at all, according to some implementations.

[0145] These computer-executable program instructions may be loaded onto a special-purpose computer or other particular machine, a processor, or other programmable data processing apparatus to produce a particular machine, such that the instructions that execute on the computer, processor, or other programmable data processing apparatus create means for implementing one or more functions specified in the flow diagram block or blocks. These

computer program instructions may also be stored in a computer-readable storage media or memory that may direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable storage media produce an article of manufacture including instruction means that implement one or more functions specified in the flow diagram block or blocks. As an example, certain implementations may provide for a computer program product, comprising a computer-readable storage medium having a computer-readable program code or program instructions implemented therein, said computer-readable program code adapted to be executed to implement one or more functions specified in the flow diagram block or blocks. The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational elements or steps to be performed on the computer or other programmable apparatus to produce a computer-implemented process such that the instructions that execute on the computer or other programmable apparatus provide elements or steps for implementing the functions specified in the flow diagram block or blocks.

[0146] Accordingly, blocks of the block diagrams and flow diagrams support combinations of means for performing the specified functions, combinations of elements or steps for performing the specified functions and program instruction means for performing the specified functions. It will also be understood that each block of the block diagrams and flow diagrams, and combinations of blocks in the block diagrams and flow diagrams, may be implemented by special-purpose, hardware-based computer systems that perform the specified functions, elements or steps, or combinations of special-purpose hardware and computer instructions.

[0147] Conditional language, such as, among others, “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain implementations could include, while other implementations do not include, certain features, elements, and/or operations. Thus, such conditional language is not generally intended to imply that features, elements, and/or operations are in any way required for one or more implementations or that one or more implementations necessarily include logic for deciding, with or without user input or prompting, whether these features, elements, and/or operations are included or are to be performed in any particular implementation.

[0148] Many modifications and other implementations of the disclosure set forth herein will be apparent having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the disclosure is not to be limited to the specific implementations disclosed and that modifications and other implementations are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

CLAIMS

What is claimed is:

1. A device, the device comprising: storage and processing circuitry, configured to:

determine one or more transmit chains of the device;

determine one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains;

determine one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and

cause to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

2. The device of claim 1, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

3. The device of claim 1, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

4. The device of claim 1, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

5. The device of claim 1, wherein the storage and processing circuitry are further configured to identify a response frame from the second device comprising feedback regarding the one or more TRN units.

6. The device of claim 1, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

7. The device of claim 1, further comprising a transceiver configured to transmit and receive wireless signals.

8. The device of claim 7, further comprising one or more antennas coupled to the transceiver.

9. A non-transitory computer-readable medium storing computer-executable instructions which when executed by one or more processors result in performing operations comprising:

determining one or more transmit chains of the device;

determining one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains;

determining one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and

causing to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

10. The non-transitory computer-readable medium of claim 9, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

11. The non-transitory computer-readable medium of claim 9, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

12. The non-transitory computer-readable medium of claim 9, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

13. The non-transitory computer-readable medium of claim 9, wherein the operations further comprise identifying a response frame from the second device comprising feedback regarding the one or more TRN units.

14. The non-transitory computer-readable medium of any one of claims 9-13, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

15. A method comprising:

determining, by one or more processors, one or more transmit chains of the device;

determining, by the one or more processors, one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains;

determining, by the one or more processors, one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and

causing to send, by the one or more processors, a physical layer (PHY) frame to a first device comprising the one or more TRN units.

16. The method of claim 15, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

17. The method of claim 15, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

18. The method of claim 15, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

19. The method of claim 15, further comprising identifying, by the one or more processors, a response frame from the second device comprising feedback regarding the one or more TRN units.

20. The method of any one of claims 15-19, wherein the one or more sequences are based at least in part on one or more of a channel bonding factor or a number of spatial streams.

21. An apparatus comprising:

means for determining one or more transmit chains of the device;

means for determining one or more training (TRN) units, wherein each TRN unit corresponds to a respective transmit chain of the one or more transmit chains;

means for determining one or more sequences in a frequency domain, wherein each sequence corresponds to a respective TRN unit of the one or more TRN units; and

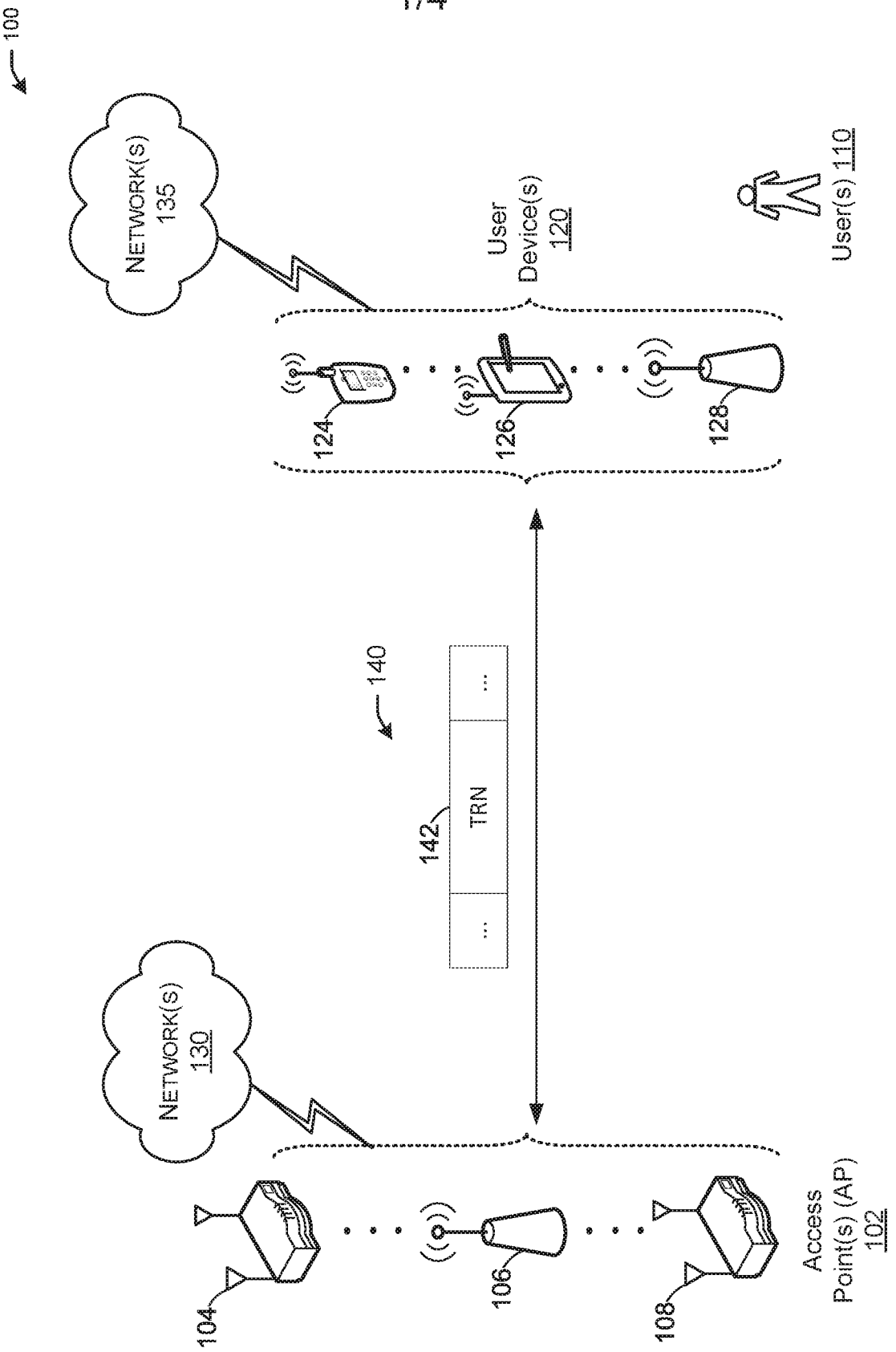
means for causing to send a physical layer (PHY) frame to a first device comprising the one or more TRN units.

22. The apparatus of claim 21, wherein the one or more sequences include a first sequence corresponding to a first TRN unit and a second sequence corresponding to a second TRN unit, and wherein the first sequence is orthogonal to the second sequence.

23. The apparatus of claim 21, wherein the one or more sequences in the frequency domain are determined based on a conversion from a time domain.

24. The apparatus of claim 21, wherein the one or more TRN units are enhanced directional multi-gigabit (EDMG) TRN units for orthogonal frequency-division multiplexing (OFDM).

25. The apparatus of any one of claims 21-24, further comprising means for identifying a response frame from the second device comprising feedback regarding the one or more TRN units.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NETWORK(S) 135
User Device(s) 120
User(s) 110
124
126
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140
142
TRN
...
...
NETWORK(S) 130
104
106
108
Access Point(s) (AP) 102

FIG. 1

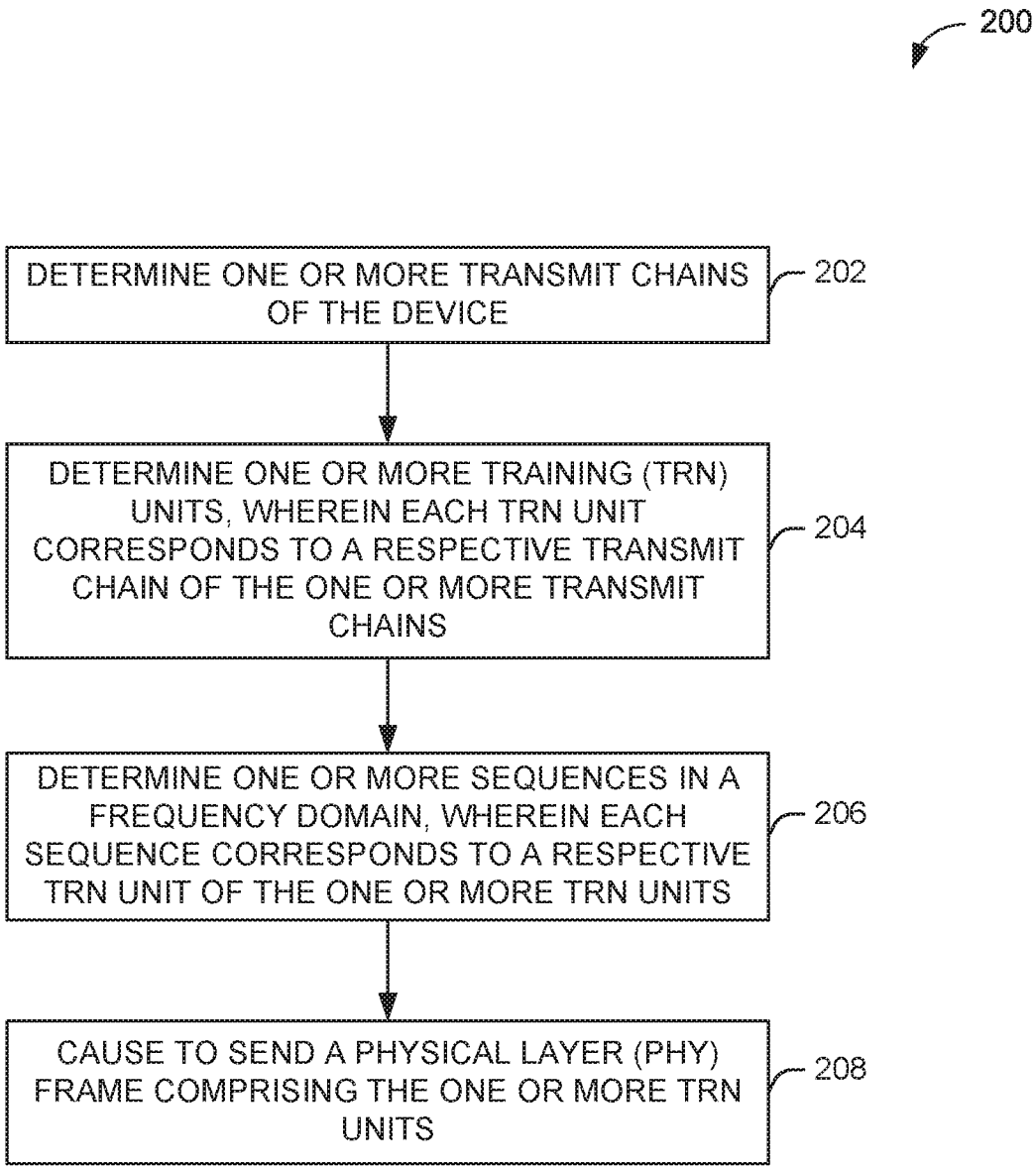
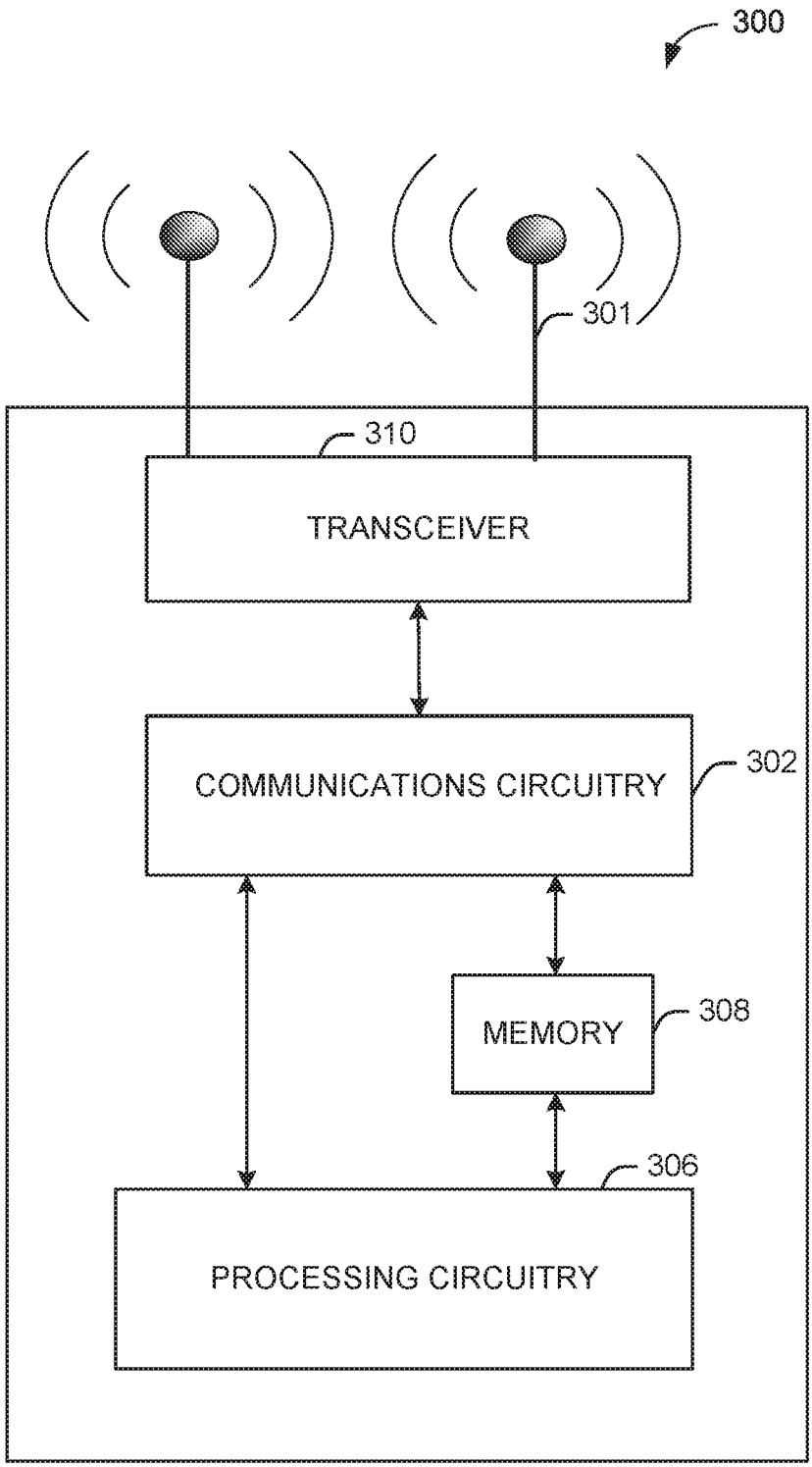

200
DETERMINE ONE OR MORE TRANSMIT CHAINS OF THE DEVICE
202
DETERMINE ONE OR MORE TRAINING (TRN) UNITS, WHEREIN EACH TRN UNIT CORRESPONDS TO A RESPECTIVE TRANSMIT CHAIN OF THE ONE OR MORE TRANSMIT CHAINS
204
DETERMINE ONE OR MORE SEQUENCES IN A FREQUENCY DOMAIN, WHEREIN EACH SEQUENCE CORRESPONDS TO A RESPECTIVE TRN UNIT OF THE ONE OR MORE TRN UNITS
206
CAUSE TO SEND A PHYSICAL LAYER (PHY) FRAME COMPRISING THE ONE OR MORE TRN UNITS
208

FIG. 2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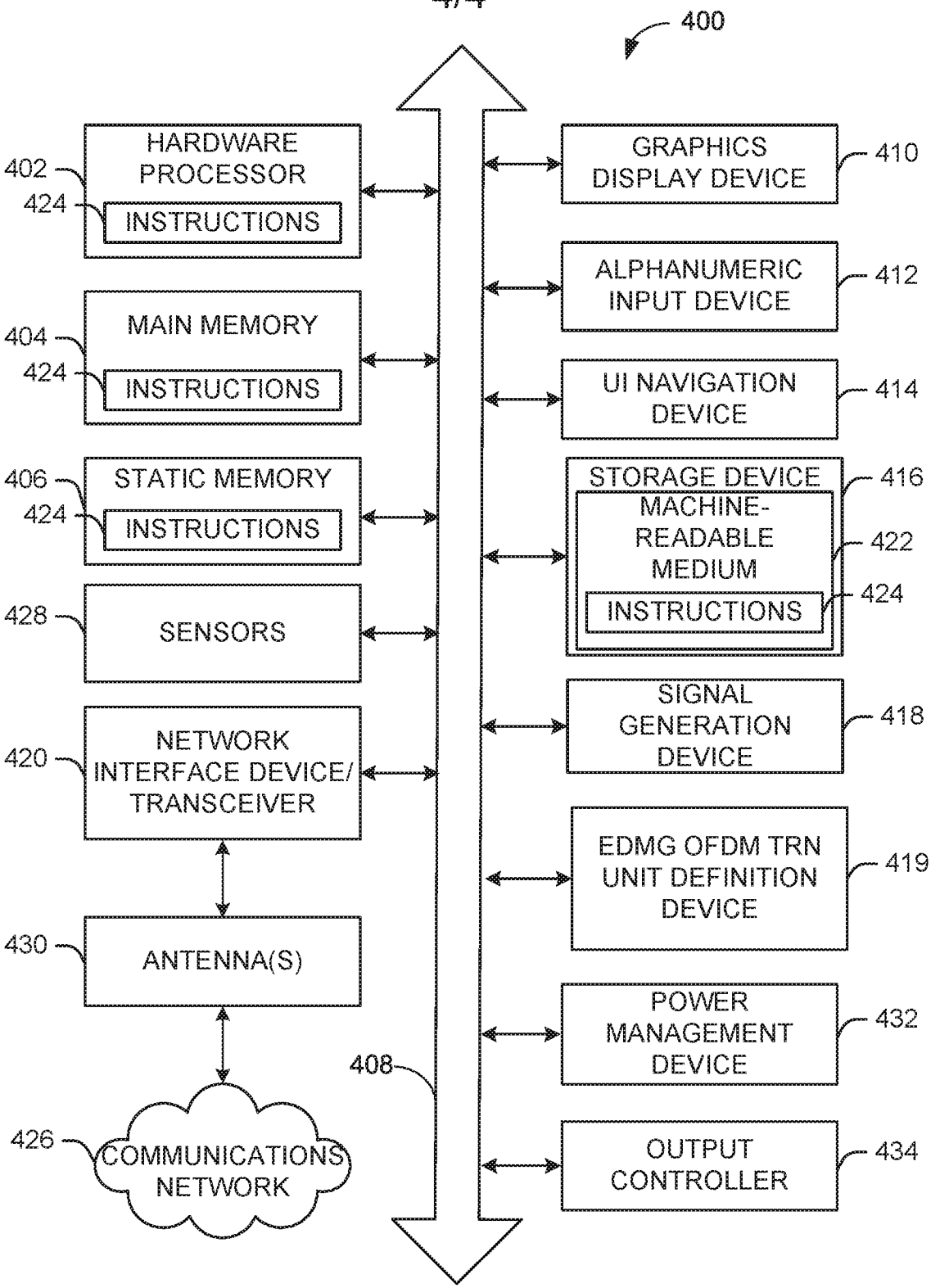
301
310
TRANSCEIVER
COMMUNICATIONS CIRCUITRY
302
MEMORY
308
306
PROCESSING CIRCUITRY

FIG. 3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HARDWARE PROCESSOR
402
424
INSTRUCTIONS
MAIN MEMORY
404
424
INSTRUCTIONS
STATIC MEMORY
406
424
INSTRUCTIONS
428
SENSORS
NETWORK INTERFACE DEVICE/ TRANSCEIVER
420
430
ANTENNA(S)
426
COMMUNICATIONS NETWORK
408
GRAPHICS DISPLAY DEVICE
410
ALPHANUMERIC INPUT DEVICE
412
UI NAVIGATION DEVICE
414
STORAGE DEVICE
416
MACHINE-READABLE MEDIUM
422
INSTRUCTIONS
424
SIGNAL GENERATION DEVICE
418
EDMG OFDM TRN UNIT DEFINITION DEVICE
419
POWER MANAGEMENT DEVICE
432
OUTPUT CONTROLLER
434

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/040991

A. CLASSIFICATION OF SUBJECT MATTER

H04L 27/26(2006.01)i, H04L 5/00(2006.01)i, H04B 7/0413(2017.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 27/26; H04B 7/04; H04B 7/06; H04L 25/02; H04L 29/06; H04L 5/00; H04B 7/0413

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: EDMG, transmit chain, training (TRN) unit, sequence, orthogonal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LEI HUANG et al., `CR on MIMO phase of SU-MIMO and MU-MIMO beamforming', IEEE 802.11-17/0541r2, 10 April 2017 See section 10.38.9.2.3.3.	1-25
Y	ARTYOM LOMAYEV et al., `Proposed Comment Resolution for CID 63, 68 in 11ay', IEEE 802.11-17/0893r2, 12 June 2017 See section 30.5.7.2.2.1.	1-25
Y	ARTYOM LOMAYEV et al., `30.6.3 OFDM EDMG-CEF Definition', IEEE 802.11-17/0596r0, 21 April 2017 See sections 30.6.3.1 - 30.6.3.2.	3-4,6,11-12,14,17-18,20,23-24
A	US 2017-0033844 A1 (INTEL IP CORPORATION) 02 February 2017 See paragraphs [0026]-[0036]; and figures 3-6.	1-25
A	US 2017-0078008 A1 (ASSAF KASHER et al.) 16 March 2017 See paragraphs [0021]-[0035]; and figures 2-5.	1-25

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 October 2018 (26.10.2018)	**26 October 2018 (26.10.2018)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea
Facsimile No. +82-42-481-8578

Authorized officer
CHIN, Sang Bum
Telephone No. +82-42-481-8398

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2018/040991

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2017-0033844 A1	02/02/2017	US 9942060 B2	10/04/2018
US 2017-0078008 A1	16/03/2017	US 2018-0198508 A1	12/07/2018
		US 9893785 B2	13/02/2018