Title: METHODS, APPARATUS AND SYSTEMS FOR CONTEXT BASED JUST-IN-TIME (JIT) VIDEO GAMERS AND SPECTATORS RECONNAISSANCE AND ASSISTANCE

Abstract: Systems, apparatus and methods for dynamically providing one or more selected portions of a game stream is disclosed. One representative method includes: determining, by a processor, one or more in-game contextually relevant metrics associated with a game stream of interest and/or a user of the game stream of interest; selecting, by the processor, at least one other game stream relevant to the game stream of interest or the user of the game stream of interest; and presenting on a display, one or more portions of the selected game stream or streams based on the in-game contextually relevant metrics.
METHODS, APPARATUS AND SYSTEMS FOR CONTEXT BASED JUST-IN-TIME (JIT) VIDEO GAMERS AND SPECTATORS RECONNAISSANCE AND ASSISTANCE

CROSS REFERENCE

[0001] This application claims the benefit of U.S. Provisional Application No. 62/206,063, filed August 17, 2015, the contents of which are incorporated by reference herein.

FIELD

[0002] The present invention relates to the field of gaming and communications and, more particularly, to methods, apparatus and systems for context based JIT video gamers and spectators reconnaissance and assistance.

RELATED ART

[0003] As more users are interested in watching games played by their friends or experts, many game titles have introduced spectator mode and enable third party plug-ins software development kits (SDKs) and/or application programming interfaces (APIs) to create game streams that can be watched by multiple spectators.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] A more detailed understanding may be had from the Detailed Description below, given by way of example in conjunction with drawings appended hereto. Figures in such drawings, like the detailed description, are examples. As such, the Figures and the detailed description are not to be considered limiting, and other equally effective examples are possible and likely. Furthermore, like reference numerals in the Figures indicate like elements, and wherein:

FIG. 1 is a system diagram illustrating an example communications system in which one or more disclosed embodiments may be implemented;

FIG. 2 is a system diagram illustrating an example wireless transmit/receive unit (WTRU) that may be used within the communications system illustrated in FIG. 1;

FIG. 3 is a system diagram illustrating an example radio access network and another example core network that may be used within the communications system illustrated in FIG. 1;

FIG. 4 is a system diagram illustrating another example radio access network and another example core network that may be used within the communications system illustrated in FIG. 1;

FIG. 5 is a system diagram illustrating a further example radio access network and a further example core network that may be used within the communications system illustrated in FIG. 1;

FIG. 6A is a diagram illustrating a game client/server architecture;

FIG. 6B is a diagram illustrating another game architecture;

FIG. 7 is a diagram illustrating a representative system for providing player and/or spectator reconnaissance and assistance services;

FIG. 8 is a diagram illustrating the layout of a representative Dashboard;

FIG. 9 is a diagram illustrating details of user interface widgets for monitoring gameplay streams;

FIG. 10 is a diagram illustrating an alternate widget;
FIG. 11 is a diagram illustrating user interface operations in accordance with at least FIG. 10; FIG. 12 is a diagram illustrating a JIT display of a game stream of interest; FIG. 13 is a diagram illustrating an operation to accept and cast a game stream to a separate screen; FIG. 14 is a diagram illustrating a game stream demarcation, indexing and data repository; FIG. 15 is a diagram illustrating the user preference profiling module that may track user activities and recommend matched game streams to spectators and/or players;

FIG. 16 is flowchart illustrating a representative method of selecting one or more game streams; FIG. 17 is flowchart illustrating a representative method of presenting game streams; FIG. 18 is flowchart illustrating another representative method of presenting game streams; FIG. 19 is flowchart illustrating a representative method of managing one or more game streams; FIG. 20 is flowchart illustrating a representative method of processing one or more game streams; and

FIG. 21 is flowchart illustrating another representative method of processing one or more game streams.

DETAILED DESCRIPTION

[0005] A detailed description of illustrative embodiments may now be described with reference to the figures. However, while the present invention may be described in connection with representative embodiments, it is not limited thereto and it is to be understood that other embodiments may be used or modifications and additions may be made to the described embodiments for performing the same function of the present invention without deviating therefrom.

[0006] Although the representative embodiments are generally shown hereafter using wireless network architectures, any number of different network architectures may be used including networks with wired components and/or wireless components, for example.

[0007] FIG. 1 is a diagram illustrating an example communications system 100 in which one or more disclosed embodiments may be implemented. The communications system 100 may be a multiple access system that provides content, such as voice, data, video, messaging, broadcast, etc., to multiple wireless users. The communications system 100 may enable multiple wireless users to access such content through the sharing of system resources, including wireless bandwidth. For example, the communications systems 100 may employ one or more channel access methods, such as code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal FDMA (OFDMA), single-carrier FDMA (SC-FDMA), and the like.

[0008] As shown in FIG. 1, the communications system 100 may include wireless transmit/receive units (WTRUs) 102a, 102b, 102c and 102d, a radio access network (RAN) 104, a core network 106/107/109, a public switched telephone network (PSTN) 108, the Internet 110, and other networks 112, though it will be appreciated that the disclosed embodiments contemplate any number of WTRUs, base stations, networks, and/or network elements. Each of the WTRUs 102a, 102b, 102c and 102d may be any type of device configured to operate and/or communicate in a wireless environment. By way of example, the WTRUs 102a, 102b, 102c and 102d, which may be referred to as a “station” and/or a “STA”, may be
configured to transmit and/or receive wireless signals and may include user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a pager, a cellular telephone, a personal digital assistant (PDA), a smartphone, a laptop, a netbook, a personal computer, a wireless sensor, consumer electronics, and the like. The WTRU 102a, 102b, 102c and 102d is interchangeably referred to as a UE.

[0009] The communications systems 100 may also include a base station 114a and/or a base station 114b. Each of the base stations 114a, 114b may be any type of device configured to wirelessly interface with at least one of the WTRUs 102a, 102b, 102c and 102d to facilitate access to one or more communication networks, such as the core network 106/107/109, the Internet 110, and/or the other networks 112. By way of example, the base stations 114a, 114b may be a base transceiver station (BTS), a Node-B, an eNode B, a Home Node B, a Home eNode B, a site controller, an access point (AP), a wireless router, and the like. While the base stations 114a, 114b are each depicted as a single element, it will be appreciated that the base stations 114a, 114b may include any number of interconnected base stations and/or network elements.

[0010] The base station 114a may be part of the RAN 103/104/105, which may also include other base stations and/or network elements (not shown), such as a base station controller (BSC), a radio network controller (RNC), relay nodes, etc. The base station 114a and/or the base station 114b may be configured to transmit and/or receive wireless signals within a particular geographic region, which may be referred to as a cell (not shown). The cell may further be divided into cell sectors. For example, the cell associated with the base station 114a may be divided into three sectors. Thus, in one embodiment, the base station 114a may include three transceivers, i.e., one for each sector of the cell. In another embodiment, the base station 114a may employ multiple-input multiple output (MIMO) technology and may utilize multiple transceivers for each sector of the cell.

[0011] The base stations 114a and 114b may communicate with one or more of the WTRUs 102a, 102b, 102c, 102d over an air interface 115/116/117, which may be any suitable wireless communication link (e.g., radio frequency (RF), microwave, infrared (IR), ultraviolet (UV), visible light, etc.). The air interface 115/116/117 may be established using any suitable radio access technology (RAT).

[0012] More specifically, as noted above, the communications system 100 may be a multiple access system and may employ one or more channel access schemes, such as CDMA, TDMA, FDMA, OFDMA, SC-FDMA, and the like. For example, the base station 114a in the RAN 103/104/105 and the WTRUs 102a, 102b and 102c may implement a radio technology such as Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access (UTRA), which may establish the air interface 115/116/117 using wideband CDMA (WCDMA). WCDMA may include communication protocols such as High-Speed Packet Access (HSPA) and/or Evolved HSPA (HSPA+). HSPA may include High-Speed Downlink (DL) Packet Access (HSDPA) and/or High-Speed UL Packet Access (HSUPA).

[0013] In another embodiment, the base station 114a and the WTRUs 102a, 102b and 102c may implement a radio technology such as Evolved UMTS Terrestrial Radio Access (E-UTRA), which may establish the air interface 115/116/117 using Long Term Evolution (LTE) and/or LTE-Advanced (LTE-A).
[0014] In other embodiments, the base station 114a and the WTRUs 102a, 102 and 102c may implement radio technologies such as IEEE 802.11 (i.e., Wireless Fidelity (WiFi)), IEEE 802.16 (i.e., Worldwide Interoperability for Microwave Access (WiMAX)), CDMA2000, CDMA2000 1X, CDMA2000 EV-DO, Interim Standard 2000 (IS-2000), Interim Standard 95 (IS-95), Interim Standard 856 (IS-856), Global System for Mobile communications (GSM), Enhanced Data rates for GSM Evolution (EDGE), GSM EDGE (GERAN), and the like.

[0015] The base station 114b in FIG. 1 may be a wireless router, Home Node B, Home eNode B, or access point, for example, and may utilize any suitable RAT for facilitating wireless connectivity in a localized area, such as a place of business, a home, a vehicle, a campus, and the like. In one embodiment, the base station 114b and the WTRUs 102c and 102d may implement a radio technology such as IEEE 802.11 to establish a wireless local area network (WLAN). In another embodiment, the base station 114b and the WTRUs 102c and 102d may implement a radio technology such as IEEE 802.15 to establish a wireless personal area network (WPAN). In yet another embodiment, the base station 114b and the WTRUs 102c and 102d may utilize a cellular-based RAT (e.g., WCDMA, CDMA2000, GSM, LTE, LTE-A, etc.) to establish a picocell or femtocell. As shown in FIG. 1, the base station 114b may have a direct connection to the Internet 110. Thus, the base station 114b may not be required to access the Internet 110 via the core network 106/107/109.

[0016] The RAN 103/104/105 may be in communication with the core network 106/107/109, which may be any type of network configured to provide voice, data, applications, and/or voice over internet protocol (VoIP) services to one or more of the WTRUs 102a, 102b, 102c and 102d. For example, the core network 106/107/109 may provide call control, billing services, mobile location-based services, pre-paid calling, Internet connectivity, video distribution, etc., and/or perform high-level security functions, such as user authentication. Although not shown in FIG. 1, it will be appreciated that the RAN 103/104/105 and/or the core network 106/107/109 may be in direct or indirect communication with other RANs that employ the same RAT as the RAN 103/104/105 or a different RAT. For example, in addition to being connected to the RAN 103/104/105, which may be utilizing an E-UTRA radio technology, the core network 106/107/109 may also be in communication with another RAN (not shown) employing a GSM, UMTS, CDMA 2000, WiMAX, or WiFi radio technology.

[0017] The core network 106/107/109 may also serve as a gateway for the WTRUs 102a, 102b, 102c and 102d to access the PSTN 108, the Internet 110, and/or the other networks 112. The PSTN 108 may include circuit-switched telephone networks that provide plain old telephone service (POTS). The Internet 110 may include a global system of interconnected computer networks and devices that use common communication protocols, such as the transmission control protocol (TCP), user datagram protocol (UDP) and/or the internet protocol (IP) in the TCP/IP internet protocol suite. The networks 112 may include wired and/or wireless communications networks owned and/or operated by other service providers. For example, the networks 112 may include another core network connected to one or more RANs, which may employ the same RAT as the RAN 103/104/105 or a different RAT.
Some or all of the WTRUs 102a, 102b, 102c and 102d in the communications system 100 may include multi-mode capabilities (e.g., the WTRUs 102a, 102b, 102c and 102d may include multiple transceivers for communicating with different wireless networks over different wireless links). For example, the WTRU 102c shown in FIG. 1 may be configured to communicate with the base station 114a, which may employ a cellular-based radio technology, and with the base station 114b, which may employ an IEEE 802 radio technology.

FIG. 2 is a system diagram illustrating an example WTRU 102. As shown in FIG. 2, the WTRU 102 may include a processor 118, a transceiver 120, a transmit/receive element 122, a speaker/microphone 124, a keypad 126, a display/touchpad 128, non-removable memory 130, removable memory 132, a power source 134, a global positioning system (GPS) chipset 136, and/or other peripherals 138, among others. It will be appreciated that the WTRU 102 may include any sub-combination of the foregoing elements while remaining consistent with an embodiment.

The processor 118 may be a general purpose processor, a special purpose processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits (ASICs), Field Programmable Gate Array (FPGAs) circuits, any other type of integrated circuit (IC), a state machine, and the like. The processor 118 may perform signal coding, data processing, power control, input/output processing, and/or any other functionality that enables the WTRU 102 to operate in a wireless environment. The processor 118 may be coupled to the transceiver 120, which may be coupled to the transmit/receive element 122. While FIG. 2 depicts the processor 118 and the transceiver 120 as separate components, it will be appreciated that the processor 118 and the transceiver 120 may be integrated together in an electronic package or chip.

The transmit/receive element 122 may be configured to transmit signals to, or receive signals from, a base station (e.g., the base station 114a) over the air interface 115/116/117. For example, in one embodiment, the transmit/receive element 122 may be an antenna configured to transmit and/or receive RF signals. In another embodiment, the transmit/receive element 122 may be an emitter/detector configured to transmit and/or receive IR, UV, or visible light signals, for example. In yet another embodiment, the transmit/receive element 122 may be configured to transmit and/or receive both RF and light signals. It will be appreciated that the transmit/receive element 122 may be configured to transmit and/or receive any combination of wireless signals.

Although the transmit/receive element 122 is depicted in FIG. 2 as a single element, the WTRU 102 may include any number of transmit/receive elements 122. More specifically, the WTRU 102 may employ MIMO technology. Thus, in one embodiment, the WTRU 102 may include two or more transmit/receive elements 122 (e.g., multiple antennas) for transmitting and receiving wireless signals over the air interface 115/116/117.

The transceiver 120 may be configured to modulate the signals that are to be transmitted by the transmit/receive element 122 and to demodulate the signals that are received by the transmit/receive element 122. As noted above, the WTRU 102 may have multi-mode capabilities. Thus, the transceiver 120
may include multiple transceivers for enabling the WTRU 102 to communicate via multiple RATs, such as UTRA and IEEE 802.11, for example.

[0024] The processor 118 of the WTRU 102 may be coupled to, and may receive user input data from, the speaker/microphone 124, the keypad 126, and/or the display/touchpad 128 (e.g., a liquid crystal display (LCD) display unit or organic light-emitting diode (OLED) display unit). The processor 118 may also output user data to the speaker/microphone 124, the keypad 126, and/or the display/touchpad 128. In addition, the processor 118 may access information from, and store data in, any type of suitable memory, such as the non-removable memory 130 and/or the removable memory 132. The non-removable memory 130 may include random-access memory (RAM), read-only memory (ROM), a hard disk, or any other type of memory storage device. The removable memory 132 may include a subscriber identity module (SIM) card, a memory stick, a secure digital (SD) memory card, and the like. In other embodiments, the processor 118 may access information from, and store data in, memory that is not physically located on the WTRU 102, such as on a server or a home computer (not shown).

[0025] The processor 118 may receive power from the power source 134, and may be configured to distribute and/or control the power to the other components in the WTRU 102. The power source 134 may be any suitable device for powering the WTRU 102. For example, the power source 134 may include one or more dry cell batteries (e.g., nickel-cadmium (NiCd), nickel-zinc (NiZn), nickel metal hydride (NiMH), lithium-ion (Li-ion), etc.), solar cells, fuel cells, and the like.

[0026] The processor 118 may also be coupled to the GPS chipset 136, which may be configured to provide location information (e.g., longitude and latitude) regarding the current location of the WTRU 102. In addition to, or in lieu of, the information from the GPS chipset 136, the WTRU 102 may receive location information over the air interface 115/116/117 from a base station (e.g., base stations 114a and 114b) and/or determine its location based on the timing of the signals being received from two or more nearby base stations. It will be appreciated that the WTRU 102 may acquire location information by way of any suitable location-determination method while remaining consistent with an embodiment.

[0027] The processor 118 may further be coupled to other peripherals 138, which may include one or more software and/or hardware modules that provide additional features, functionality and/or wired or wireless connectivity. For example, the peripherals 138 may include an accelerometer, an e-compass, a satellite transceiver, a digital camera (for photographs and/or video), a universal serial bus (USB) port, a vibration device, a television transceiver, a hands free headset, a Bluetooth® module, a frequency modulated (FM) radio unit, a digital music player, a media player, a video game player module, an Internet browser, and the like.

[0028] The WTRU 102 may include a full duplex radio for which transmission and reception of some or all of the signals (e.g., associated with particular subframes for both the UL (e.g., for transmission) and downlink (e.g. for reception) may be concurrent and/or simultaneous. The full duplex radio may include an interference management unit (no shown) to reduce and or substantially eliminate self-interference via either hardware (e.g., a choke) or signal processing via a processor (e.g., a separate processor (not shown) or via processor 118).
FIG. 3 is a system diagram illustrating the RAN 103 and the core network 106 according to another embodiment. As noted above, the RAN 103 may employ a UTRA radio technology to communicate with the WTRUs 102a, 102b, and 102c over the air interface 115. The RAN 103 may also be in communication with the core network 106. As shown in FIG. 3, the RAN 103 may include Node-Bs 140a, 140b, and 140c, which may each include one or more transceivers for communicating with the WTRUs 102a, 102b, and 102c over the air interface 115. The Node-Bs 140a, 140b, 140c may each be associated with a particular cell (not shown) within the RAN 103. The RAN 103 may also include RNCs 142a and 142b. It will be appreciated that the RAN 103 may include any number of Node-Bs and RNCs while remaining consistent with an embodiment.

As shown in FIG. 3, the Node-Bs 140a and 140b may be in communication with the RNC 142a. Additionally, the Node-B 140c may be in communication with the RNC 142b. The Node-Bs 140a, 140b and 140c may communicate with the respective RNCs 142a and 142b via an Iub interface. The RNCs 142a and 142b may be in communication with one another via an Iur interface. Each of the RNCs 142a and 142b may be configured to control the respective Node-Bs 140a and 140b, and 140c to which it is connected. In addition, each of the RNCs 142a and 142b may be configured to carry out or support other functionality, such as outer loop power control, load control, admission control, packet scheduling, handover control, macrodiversity, security functions, data encryption, and the like.

The core network 106 shown in FIG. 3 may include a media gateway (MGW) 144, a mobile switching center (MSC) 146, a serving GPRS support node (SGSN) 148, and/or a gateway GPRS support node (GGSN) 150. While each of the foregoing elements are depicted as part of the core network 106, it will be appreciated that any one of these elements may be owned and/or operated by an entity other than the core network operator.

The RNC 142a in the RAN 103 may be connected to the MSC 146 in the core network 106 via an IuCS interface. The MSC 146 may be connected to the MGW 144. The MSC 146 and the MGW 144 may provide the WTRUs 102a, 102b and 102c with access to circuit-switched networks, such as the PSTN 108, to facilitate communications between the WTRUs 102a, 102b and 102c and traditional land-line communications devices.

The RNC 142a in the RAN 103 may also be connected to the SGSN 148 in the core network 106 via an IuPS interface. The SGSN 148 may be connected to the GGSN 150. The SGSN 148 and the GGSN 150 may provide the WTRUs 102a, 102b and 102c with access to packet-switched networks, such as the Internet 110, to facilitate communications between and the WTRUs 102a, 102b and 102c and IP-enabled devices.

As noted above, the core network 106 may also be connected to the other networks 112, which may include other wired and/or wireless networks that are owned and/or operated by other service providers.

FIG. 4 is a system diagram illustrating the RAN 104 and the core network 107 according to an embodiment. As noted above, the RAN 104 may employ an E-UTRA radio technology to communicate
with the WTRUs 102a, 102b and 102c over the air interface 116. The RAN 104 may also be in communication with the core network 107.

[0036] The RAN 104 may include eNode-Bs 160a, 160b and 160c, though it will be appreciated that the RAN 104 may include any number of eNode-Bs while remaining consistent with an embodiment. The eNode-Bs 160a, 160b and 160c may each include one or more transceivers for communicating with the WTRUs 102a, 102b and 102c over the air interface 116. In one embodiment, the eNode-Bs 160a, 160b and 160c may implement MIMO technology. Thus, the eNode-B 160a, for example, may use multiple antennas to transmit wireless signals to, and/or receive wireless signals from, the WTRU 102a.

[0037] Each of the eNode-Bs 160a, 160b and 160c may be associated with a particular cell (not shown) and may be configured to handle radio resource management decisions, handover decisions, scheduling of users in the UL and/or DL, and the like. As shown in FIG. 4, the eNode-Bs 160a, 160b and 160c may communicate with one another over an X2 interface.

[0038] The core network 107 shown in FIG. 4 may include a mobility management entity (MME) 162, a serving gateway (SGW) 164, and a packet data network (PDN) gateway (or PGW) 166. While each of the foregoing elements are depicted as part of the core network 107, it will be appreciated that any of these elements may be owned and/or operated by an entity other than the core network operator.

[0039] The MME 162 may be connected to each of the eNode-Bs 160a, 160b and 160c in the RAN 104 via an S1 interface and may serve as a control node. For example, the MME 162 may be responsible for authenticating users of the WTRUs 102a, 102b and 102c, bearer activation/deactivation, selecting a particular serving gateway during an initial attach of the WTRUs 102a, 102b and 102c, and the like. The MME 162 may provide a control plane function for switching between the RAN 104 and other RANs (not shown) that employ other radio technologies, such as GSM and/or WCDMA.

[0040] The serving gateway 164 may be connected to each of the eNode Bs 160a, 160b and 160c in the RAN 104 via the S1 interface. The serving gateway 164 may generally route and forward user data packets to/from the WTRUs 102a, 102b and 102c. The serving gateway 164 may perform other functions, such as anchoring user planes during inter-eNode B handovers, triggering paging when DL data is available for the WTRUs 102a, 102b and 102c, managing and storing contexts of the WTRUs 102a, 102b and 102c, and the like.

[0041] The serving gateway 164 may be connected to the PDN gateway 166, which may provide the WTRUs 102a, 102b and 102c with access to packet-switched networks, such as the Internet 110, to facilitate communications between the WTRUs 102a, 102b and 102c and IP-enabled devices.

[0042] The core network 107 may facilitate communications with other networks. For example, the core network 107 may provide the WTRUs 102a, 102b and 102c with access to circuit-switched networks, such as the PSTN 108, to facilitate communications between the WTRUs 102a, 102b and 102c and traditional land-line communications devices. For example, the core network 107 may include, or may communicate with, an IP gateway (e.g., an IP multimedia subsystem (IMS) server) that serves as an interface between the core network 107 and the PSTN 108. In addition, the core network 107 may provide the WTRUs 102a,
102b and 102c with access to the other networks 112, which may include other wired and/or wireless networks that are owned and/or operated by other service providers.

[0043] FIG. 5 is a system diagram illustrating the RAN 105 and the core network 109 according to an embodiment. The RAN 105 may be an access service network (ASN) that employs IEEE 802.16 radio technology to communicate with the WTRUs 102a, 102b and 102c over the air interface 117. As will be further discussed below, the communication links between the different functional entities of the WTRUs 102a, 102b and 102c, the RAN 105, and the core network 109 may be defined as reference points.

[0044] As shown in FIG. 5, the RAN 105 may include base stations 180a, 180b and 180c, and an ASN gateway 182, though it will be appreciated that the RAN 105 may include any number of base stations and ASN gateways while remaining consistent with an embodiment. The base stations 180a, 180b and 180c may each be associated with a particular cell (not shown) in the RAN 105 and may each include one or more transceivers for communicating with the WTRUs 102a, 102b and 102c over the air interface 117. In one embodiment, the base stations 180a, 180b and 180c may implement MIMO technology. The base station 180a, for example, may use multiple antennas to transmit wireless signals to, and/or receive wireless signals from, the WTRU 102a. The base stations 180a, 180b and 180c may also provide mobility management functions, such as handoff triggering, tunnel establishment, radio resource management, traffic classification, quality of service (QoS) policy enforcement, and the like. The ASN gateway 182 may serve as a traffic aggregation point and may be responsible for paging, caching of subscriber profiles, routing to the core network 109, and the like.

[0045] The air interface 117 between the WTRUs 102a, 102b and 102c and the RAN 105 may be defined as an RI reference point that implements the IEEE 802.16 specification. In addition, each of the WTRUs 102a, 102b and 102c may establish a logical interface (not shown) with the core network 109. The logical interface between the WTRUs 102a, 102b and 102c and the core network 109 may be defined as an R2 reference point, which may be used for authentication, authorization, IP host configuration management, and/or mobility management.

[0046] The communication link between each of the base stations 180a, 180b and 180c may be defined as an R8 reference point that includes protocols for facilitating WTRU handovers and the transfer of data between base stations. The communication link between the base stations 180a, 180b, 180c and the ASN gateway 182 may be defined as an R6 reference point. The R6 reference point may include protocols for facilitating mobility management based on mobility events associated with each of the WTRUs 102a, 102b and 102c.

[0047] As shown in FIG. 5, the RAN 105 may be connected to the core network 109. The communication link between the RAN 105 and the core network 109 may be defined as an R3 reference point that includes protocols for facilitating data transfer and mobility management capabilities, for example. The core network 109 may include a mobile IP home agent (MIP-HA) 184, an authentication, authorization, accounting (AAA) server 186, and a gateway 188. While each of the foregoing elements are depicted as part of the core network 109, it will be appreciated that any of these elements may be owned and/or operated by an entity other than the core network operator.
[0048] The MIP-HA 184 may be responsible for IP address management, and may enable the WTRUs 102a, 102b and 102c to roam between different ASNs and/or different core networks. The MIP-HA 184 may provide the WTRUs 102a, 102b and 102c with access to packet-switched networks, such as the Internet 110, to facilitate communications between the WTRUs 102a, 102b, and 102c and IP-enabled devices. The AAA server 186 may be responsible for user authentication and for supporting user services. The gateway 188 may facilitate interworking with other networks. For example, the gateway 188 may provide the WTRUs 102a, 102b and 102c with access to circuit-switched networks, such as the PSTN 108, to facilitate communications between the WTRUs 102a, 102b and 102c and traditional land-line communications devices. The gateway 188 may provide the WTRUs 102a, 102b and 102c with access to the other networks 112, which may include other wired and/or wireless networks that are owned and/or operated by other service providers.

[0049] Although not shown in FIG. 5, it will be appreciated that the RAN 105 may be connected to other ASNs, other RANS (e.g., RANs 103 and/or 104) and/or the core network 109 may be connected to other core networks (e.g., core network 106 and/or 107. The communication link between the RAN 105 and the other ASNs may be defined as an R4 reference point, which may include protocols for coordinating the mobility of the WTRUs 102a, 102b and 102c between the RAN 105 and the other ASNs. The communication link between the core network 109 and the other core networks may be defined as an R5 reference, which may include protocols for facilitating interworking between home core networks and visited core networks.

[0050] Although the WTRU is described in FIGS. 1-5 as a wireless terminal, it is contemplated that in certain representative embodiments that such a terminal may use (e.g., temporarily or permanently) wired communication interfaces with the communication network.

[0051] In certain representative embodiments, the other network 112 may be a WLAN or coupled to a game server 630, 650, 660 or the 3rd party service 680 to provide game services to a WTRU 102 and/or a game device 610, 630, 650 and/or 670 either through the core network or via the Internet 110, for example via a game client/server architecture by wired or wireless communications.

[0052] In certain representative embodiments, context aware game stream demarcation, indexing and/or ranking functions/modules may be implemented which may enable visualization and JIT assistance for game stream recommendations to a number (a large number (e.g., above a threshold number) of spectators and/or players simultaneously.

[0053] In certain representative embodiments, a continually updating dashboard that may help users stay informed on game streams may be implemented.

[0054] In certain representative embodiments, browsing and/or searching other gamers and/or gameplay of interest may be implemented using “soft” contextual attributes such as gamer behavior and gamer skill.

[0055] In certain representative embodiments, displaying the “right moment” within contextually related streams may be implemented, for example, to enable players to overcome present, time-sensitive, in-game challenges.
[0056] In certain representative embodiments, a mechanism/operation may be implemented to find players or streams that may be stored or live that match (either completely or partially) a particular (and/or range of) gameplay skill level, and/or style (according to a profile object).

[0057] In certain representative embodiments, a novel visual display/spectator user interface may be implemented, for example, to continuously monitor a (small or large) set of gameplay (e.g., game) streams, found using the techniques/operations set forth herein. The streams may be visualized as a condensed symbolic and/or visual form on the display/spectator user interface.

[0058] In certain representative embodiments, a function/module and/or device may be implemented to enable watching of live and/or recorded gameplay (e.g., gaming) on-demand (with very little time between query and playback) so as to improve, get help, and/or mitigate a challenging level on a JIT basis.

[0059] In certain representative embodiments, automatic initiation of a live stream may be implemented when a given user is approaching a challenging part of a game (e.g., the system may anticipate the need for a contextual stream and may begin the stream). In certain representative embodiments, the live stream may be initiated by the user, as appropriate.

[0060] In certain representative embodiments, a novel graphical user interface may be implemented, which may offer a view of the JIT information: (1) non-intrusive, e.g., via side-by-side display with the user’s game session (the system may auto-position (e.g., determine and/or attempt to auto-position) the reference stream at a moment that matches the current challenge); and/or presented on a second screen (e.g., a TV, a mobile, and/or Google glass, among other) and/or (2) ghosted (layered and/or interleaved) atop (e.g., with) the users present view.

[0061] In certain representative embodiments, methods, apparatus and/or system may be implemented, e.g., to support JIT gamer and spectator reconnaissance and/or assistance services for multiple games.

[0062] In certain representative embodiments, easy to use context aware search functions/modules and/or interfaces may be implemented, e.g., for casual users to quickly select game stream of interests (e.g., for entertainment purposes).

[0063] In certain representative embodiments, automated game stream analysis, demarcation, and/or pattern matching and user profiling may be implemented, for example, to provide effective recommendation of a specific game stream to player having difficulties in a specific game session.

[0064] Live and/or recorded game streams may be available for a number of general audiences and/or players to select from. Some of the users (e.g., of the spectator mode) may be the general audience, who may watch game videos for entertainment. Other users may actually join a live game in a spectator mode (e.g., which may be provided via the game engine). Different users may have different preference and/or behavior profiles. Their profiles may be used to recommend one or more game streams for viewing (e.g., to watch). In-game events and/or player metrics may be logged as metadata to label and/or describe semantics of a game stream and may form the basis for profiling the game stream, searching the game stream and/or providing a machine-readable understanding of game situations in the game stream. Players may invite other players to help overcome difficulties encountered in a game session. In certain representative embodiments, “just-in-time” game stream recommendations may be implemented that may
help users mitigate in-game challenges. For example, for a particular user, which may be engaging with a particular game, who may want to improve, learn, team-up (co-play) with other players, quickly finding game streams and users that are contextually relevant may be useful. For example, a stream S may be contextually relevant to a user U if the players P depicted in stream S are playing a game G at a particular level L with a particular style T and (e.g., *and* *) if any of players P, game G, level L and/or style T are or may be contextually related to user U. A tool/process or apparatus (e.g., hardware and/or software tool) that may flexibly display and/or update the streams S may be implemented for the user U to use. If a stream S is deemed contextually relevant to the user U, the ability to find the moment or moments (e.g., time locations) in S that may be most helpful may be implemented.

[0065] A real-time complex behavior event pattern detection and remedial action system may be implemented (e.g., to improve user experience and/or customer retention). A dynamic user profiling system may be implemented (e.g., to track, characterize, and/or generate a behavior analysis data stream to support context aware model driven event pattern detections and/or remedial actions for personalized services). A context aware behavior detection and/or content creation methods and system may enable a player to identify qualified content creators in proximity of particular players to generate and/or delivery real-time content that may be relevant to the players’ needs (e.g., game situation). A game state transfer process may enable the game state transfer between any of the players and/or spectators.

[0066] In certain representative embodiments, methods and apparatus may be implemented to enable online game spectating and/or game content sharing services. Such methods or apparatus may provide mechanisms to generate descriptors based on context and/or behavior profile and may support fast search processes, automatically. For example, spectator mode may provide a search by game ID, player ID, game mode and/or game type, among others.

[0067] In certain representative embodiments, the users may search for game streams (1) by browsing (e.g., via a scroll operation) a result screen of items (e.g., games, channels, and/or stored videos) (e.g., in an order determined, for example by popularity (e.g., the number of viewers interested in the particular item)); (2) randomly; (3) by game name; (4) by channel name (e.g., such that a channel may show one or more games, teams and/or videos); (5) by team (which may include a named group of players); (6) by channel/video title (e.g., using free text); and/or (7) by player name.

[0068] In certain representative embodiments, searches of streams may be implemented that may be contextually relevant to a given reference game stream and/or to streams that are similar stylistically. For example, gameplay “Style” may be a profiled metric determined through an analysis of fine-grained in-game actions.

[0069] In certain representative embodiments, methods and apparatus may be implemented to match one or more interests of players and spectators based on real-time in-game behavior patterns. For example, spectators, using contextually relevant metrics associated with particular game streams, may be provided with game streams having relevant new information and techniques or other information (e.g., which may enable the spectators to improve their game skills.
[0070] In certain representative embodiments, contextually relevant streams (and/or particular portions thereof) may be determined on an “ongoing” basis, and/or by using a one-off search.

[0071] In certain representative embodiments, user interfaces may be implemented for visualizing the streams, e.g., in a compact manner.

[0072] After a stream is identified (e.g., if the stream is contextually relevant), the user may play the stream from start to finish. In certain representative embodiments regardless as to how a user U arrives at a particular stream S (e.g., where the user U is attempting to mitigate a challenge C), the user may not be interested in the preamble or lead-up parts of the stream S and/or the end portions of the stream S. The user U may be interested to view how the players in stream S mitigate (e.g., in real time or near real time, for example), or have already mitigated the same challenge when the challenge is or was presented to them. For example, an auto-jump operation may be implemented to jump from the start of the stream immediately or based on user input/setting to the part that most directly provides assistance to user U.

[0073] In certain representative embodiments, when a gamer is “stuck” at a game G situation S (e.g., when a portal she is to enter is blocked by a “big boss” monster), various operations and apparatus are disclosed which may enable resolution of the situation S without manually performing one or more of the following: (1) pause the game G or hide in-game (e.g., such that the situation S allows for her to “live a little longer”); (2) open a new window or switch attention to a new device with Internet connection; (3) search for help; (4) watch the help; and/or (5) shift attention back to the game G and make an attempt to maneuver in to mitigate the challenge C presented at situation S.

[0074] By not requiring (e.g., eliminating the need for) the above actions, the gamers may quickly and fluidly learn new strategies and skills, improve their standings in games, and be more fulfilled with the gaming user experience.

[0075] In certain representative embodiments, methods, apparatus and systems may be implemented to support just-in-time gamer and spectator reconnaissance and assistance services. Players and/or spectators may be users of such methods, apparatus and/or systems. Spectators may be a casual audience interested in watching one or more games from a third party game stream provider and/or may join a specific game as a spectator using a spectator mode (e.g., supported by a specific game engine). Players may be invited as spectators and/or may select to be spectators to watch one or more games and/or to provide assistance to one or more players. Various representative embodiments may include any one or more of the following: (1) context aware game stream demarcation, indexing and/or ranking functions/operations for visualization and/or “just-in-time” (JIT) assistance for game stream recommendations to a number (e.g., large number) of spectators and players (e.g., simultaneously or near simultaneously); (2) presentation of an updated (e.g., continually updated) dashboard that may assist or help the users stay informed regarding game streams; (3) spectators browsing and/or searching other gamers and/or gameplay of interest using contextual attributes (e.g., “soft” contextual attributes) such as gamer behavior and gamer skill (e.g., skill level and/or skill set attributes, among others); (4) display/presentation of the relevant portion of the related stream (e.g., display of the contextually relevant game stream at the “right moment”) within the stream (e.g., to
address the situation S and/or challenge C of the user U such that the players may efficiently overcome present, time-sensitive, in-game challenges.

[0076] FIG. 6A is a diagram illustrating a representative gaming client/server architecture.

[0077] Referring to FIG. 6A, the representative gaming client/server architecture 600 may include a game client 610 in communication with a game server 630. The game client (e.g., game client device) 610 may include a transmit/receive unit 612, a processor 614, a user interface/display unit 616, a memory/storage unit 618 and/or antenna 620 among others. The game server (e.g., game server device) 630 may include a transmit/receive unit 632, a processor 634, a user interface/display unit 636, a memory/storage unit 638 and/or an antenna 639, among others.

[0078] It is contemplated that the game client 610 and game server 630 may communicate via any backbone network (wired and/or wireless), for example, over network or network links 110, 112, 115, 116 and/or 117, among others. (e.g., including but not limited to the networks shown in FIGS. 1-5). The game server device 630 may include a server spectator function/module to provide, for example, the spectator services (e.g., recommendations and/or JIT service disclosed herein). The game client device 610 may be a WTRU 102 or wired device. The game client 610 may include a client spectator function/module to provide, for example, client functions of the spectator service (such a rendering of the spectator services) as disclosed herein.

[0079] FIG. 6B is a diagram illustrating another representative gaming architecture.

[0080] Referring to FIG. 6B, the representative gaming architecture 640 may include one or more game servers 650, one or more other servers 660 (e.g., for reconnaissance and assistance service function modules), one or more user devices (e.g., end user devices) 670 (for example, a WTRU 102 or other wired or wireless game device 610, among others), 3rd party game video services 680 and/or a wired or wireless network 690 for communication between or among the one or more game servers 650, the other servers 660, the one or more user devices 670 and/or the 3rd party game video services 680.

[0081] The game server 650 may include a processor 652, a memory/storage unit 654, a disk 656 and/or a wired or wireless networking adaptor 658, among others. The other server for reconnaissance and assistance service function modules 660 may include a wired or wireless networking adaptor 662, a processor 664, a memory/storage unit 666, and/or a disk 668, among others. The user device 670 may include a wired or wireless networking adaptor 672, a processor 674, a memory/storage unit 676, and/or a disk 678, among others.

[0082] Referring now to FIGS 6A and 6B, the game stream reconnaissance and assistance service functions/modules 660 may run or execute in one or more servers as an service independent from the game servers 650 and/or in the game servers 650 and may provide service interfaces to the user clients 610 and/or 670 (for players and/or spectators), the game servers 650, and the 3rd party game video servers 680 via the wired and/or the wireless backbone network 690. The service function components may process data generated from game servers 650, network 690, and/or users (e.g., user devices and/or game devices) 670 based on behavior profiling, event pattern matching rules, and/or filters to find desired results such that the “right” streams of interests may be delivered just-in-time. The results of event pattern matching may be a
set of demarcation points assigned to particular event during the gameplay (e.g., a “kill”, or a “challenge
overcome”).

[0083] The 3rd party game video services 680, although not shown for brevity, may include one or more
servers with components/modules/functions the same as or similar to any combination of the game server
650 and/or the other server 660 and may include reconnaissance and assistance functions/modules. The
3rd party video services 680 may provide 3rd party game services such as video content services, and/or
spectator services, among others.

[0084] Although a number of gaming architectures are shown, other architectures are possible including
an architecture with the server spectator function/modules integrated into the client device.

[0085] One of skill in the art understands certain components (e.g., game servers 630 and/or 650) of the
representative system may function as either a game device or a game server. For example, a 3rd party
service may provide some or all of the reconnaissance and assistance service functions and the game server
may provide certain gaming functionality (for example, enabling an end user device, game server, 3rd party
server architecture). In certain representative embodiments, the reconnaissance and assistance service
functions may be provided by the other server 660 (for example, enabling an end user device, two game
server architecture). In certain representative embodiments, the reconnaissance and assistance service
functions may be provided by game server 650 (for example, enabling an end user device, single game
server architecture). One of skill in the art understands that other device configurations are possible
including a split of the reconnaissance and assistance service functions between the other server 660 and
the 3rd party server and/or the game server 650 providing certain functionality and/or operations associated
with a game control and graphic engine as set forth below.

[0086] FIG. 7 is a diagram illustrating a representative system for providing player and/or spectator
reconnaissance and assistance services.

[0087] As illustrated in FIG. 7, the representative system 700 may include spectator client graphical user
interfaces (GUIs) 710, game control and graphic engines 720 and player client GUIs 730 and associated
APIs to connect to the reconnaissance and assistance service 740. The reconnaissance and assistance
service 740 may include a reconnaissance and assistance service processing device/module/function 750,
a metadata and meta-rule repository 760 and/or a game stream services repository 770.

[0088] The reconnaissance and assistance service processing (e.g., device/module/function) 750 may
provide: (1) visualization processing including browsing, search and/or dashboard capabilities, among
others; (2) game stream processing including pattern matching, demarcation metadata extraction, metadata
indexing and game stream linking, among others; and/or (3) Just-In-Time (JIT) assistance including
behavior profiling, demarcation point pattern matching and/or display and/or replay recommendation
processing, among others. The metadata and meta-rule repository 760 may provide: (1) spectator and player
behavior profiles, (2) metadata and/or patterns for game stream demarcation points; (3) meta-rules for
saving and/or linking metadata with game streams; and/or (4) player and/or spectator game stream usage
records, among others. The game stream services repository 770 may provide recorded video and/or
animation sequences (e.g., for display) and/or recorded game state (e.g., for replay), among others.
Using the spectator client graphical user interfaces (GUIs) 710 and player client GUIs 730 and associated APIs, spectators may choose to watch a live game session by connecting to a game server (e.g., game server 630 or 650) using a game client (e.g., game client 610 or 670) supported by the spectator mode of the game. Players may invite spectators in real-time and/or may publish game videos to third party game content sharing services.

The representative system 700 may perform player/spectator behavior profiling and/or game event pattern detection on large amounts of game events (e.g., to support JIT assistance to assist or help a player overcome in-game challenges. On detecting a pattern of interest specified by one or more spectators or players, the representative system 700 may generate metadata descriptors, for example as demarcation points, to indicate points for dividing the game streams into small sub-streams. The metadata descriptor may be used as part of the information to organize the game streams for fast context aware search and/or recommendation operations. For example, a viewer, who may be offered a video with such a demarcation point, may have the ability to jump to a relevant spot in the stream (e.g., as opposed to watching from the start) automatically (e.g., without user intervention), with user input, based on a preset configuration by the user and/or based on rules (e.g., meta-rules and/or context-based rules), among others.

The representative system 700 may use the spectator mode SDKs provided by game developers (e.g., RiotGameAPI) for players to invite spectators to join an interesting game session and/or to obtain JIT assistance from one or more spectators. The services may consist of or include service components such as a browsing component, a search component, a behavior profiling component, a game event pattern detection component, a recommendation component, and/or a JIT assistance services component.

The representative system 700 may provide the metadata and meta-rule repository 770 to track and/or detect user behavior (e.g., player and/or spectator behavior) and game event patterns (e.g., real-time game event patterns) that may be of interest and/or useful to the users (for example to support fast search and recommendation of one or more game streams of interests to players and/or spectators). The metadata may consist of or may include player and/or spectator behavior profiles and pattern matching events. Meta-rules may enable game developers and/or third party service providers to link and/or assemble the sub-streams of game streams with the metadata. A meta-rule may generally define or provide the conditions and/or actions to generate a composite game stream. The composite game stream may consist of or may include a set of links that may contain multiple relevant sub-game sections of interest to a user. The links may consist of or may include time, service entry points (for example, uniform resource identifiers (URIs)), players, game scenarios, and other attributes (e.g., context relevant information such as skill level of the player, attributes of the game play, for example the number of kick, punches, and/or percentage of contacts with a game opponent, among others, during the relevant segment, for example one or more sub-streams of the game streams) (e.g., to support fast search of the one or more sub-streams of the game streams from one or more players that may be associated with different game sub-streams).

A game stream services repository 770 may include a game stream service entry point repository and may support one or more actual APIs and/or administration functions used to manage usage of the game streams. For example, game developers may provide usage collection for billing and/or customer
service operations. Usage information may be used to optimize storage and/or to observe consumption behavior for recommendations (e.g., effective recommendations). The game stream services repository 770 may consist of or may include any of: (1) the game streams, (2) game states (e.g., used to replay animations, video clips, and/or HTML5 scripts, among others), and/or (3) local storage data (e.g., used for replay of a game from a previous game state), among others. The game stream may include some or all of this information or portions of the information may be provided separately.

[0094] In certain representative embodiments, the representative system may analyze game state artifacts to provide insights into actions of one or more particular users and/or to classify and/or to quantify the users in a profile object. A pattern of game state occurrences over time (within a given game G and a given user U) may provide a “finger-print” of in-game action, and may be compared with a fixed pattern (e.g., a reference pattern, for example devised by the game authors, which may convey principle events generated while playing (e.g., successfully through) the game (e.g., a part or the game or the whole game). The presence of the former type of pattern within one of the game’s fixed patterns may help to link the gameplay in question to a particular part of the game script (e.g., may determine whether a particular part of a game script is linked to the gameplay in quest of the user).

Representative Game Visualization GUI Capabilities for Players and/or Spectators

[0095] Representative embodiments include capabilities for game visualization. For example, the system may provide multiple visualization capabilities (e.g., multiple new visualization capabilities) that may support the following:

(1) the users finding and/or following (via user input or automatically via the system 700) live and/or saved streams that feature gamers whose skill levels are comparable in some way (e.g., level of difficulty achieved in the game, proficiency at one or more aspects of the game (e.g., kicking/kicking metrics, punching/punching metrics, ability to achieve a result, time to achieve a particular result, and other results oriented metrics, among many others)) to their own. In certain representative embodiments a query may be generated and issued to:

a) view users at the gamer’s skill level (e.g., in a range around a first threshold (gamer’s threshold) (e.g., “let the gamer watch other players at the gamer’s skill level, for example, so that the gamer can learn techniques to incorporate into the gamer’s own present style”).

b) view users above the gamer’s skill level (e.g., above the gamer’s threshold) (e.g., “let the gamer watch users above the gamer’s skill level so that the gamer can view techniques that the gamer is to master”).

c) view users below the gamer’s skill level (e.g., below the gamer’s threshold) (e.g., “let the gamer watch beginner players, for example, just for amusement”);

(2) the users finding and/or following (via user input or automatically via the system 700) live and/or saved streams that are helpful (e.g., most helpful) in specific in-game situations (and/or impediments). In certain representative embodiments a query may be generated and/or issued to:

a) view sub-streams/streams associated with the in-game situation (e.g., the game level involved, the obstacle involved, and/or an in-game technique involved, among others (e.g.,
show the gamer streams where other players are mitigating the same obstacles that the
gamer is mitigating’’); (3) the users searching (via user input or automatically via the system) streams using any combination of the above:
   a) view sub-streams streams with multiply contextually relevant criteria (e.g., “show gamer streams where other players are better (e.g., slightly better) than the gamer playing (e.g., Black Ops 2 at the big boss level near the airport’’); (4) the users (via user input or automatically via the system 700) may be provided JIT help for mitigating in-game challenges. It is contemplated that such queries may be time-sensitive, for example, as the gamer’s avatar may perish if the gamer does not mitigate the challenge soon:
   a) view streams where another player is in the same or a similar situation (e.g., “where the gamer is presently stuck at scenario X in game G’’).

[0096] To support the above characteristics the system 700 may have one or more of the following:

(1) a first capability including:
   a) a mechanism (e.g., a query and/or processing mechanism such as in a WTRU 102, a UE or another wired or wireless device, which may include but is not limited to a mobile terminal and/or any wired or wireless device such as a server running the service functions described herein (e.g., that may transmit and/or receive (Tx/Rx) wireless data with a wireless client), for example to find players and/or streams (e.g., stored and/or live) that match (e.g., completely or partially) a particular (or range of): gameplay skill levels, styles (according to a profile object), and/or game scenarios, among others; and/or
   b) a visual mechanism (e.g., display and/or processing mechanism such as in the WTRU 102, the UE or the other wired or wireless device) to monitor (e.g., continuously monitor) a set of identified gameplay streams, for example identified based on contextual gameplay relevancy. It is contemplated that the visual display may be a stream or condensed symbolic or a visual form on a user interface.

(2) a second capability including:
   a) a mechanism (e.g., display and/or processing mechanism such as in the WTRU 102, the UE or the other wired or wireless device) to watch live and/or recorded gameplay on-demand (e.g., with no or essentially no time (e.g., very little time) between query and playback)) so as to improve, get help, and/or mitigate a challenging level on a JIT basis; and/or
   b) a triggering mechanism (and/or a processing mechanism) such as in the WTRU 102 or the other wired or wireless device for triggering:
      1) a live stream that may be automatically initiated when a given user is approaching a challenging part of the game (i.e., the system 700 may anticipate the use for a contextual stream and may begin the stream based on a trigger associated with a challenge C).
2) by the user, for example based on user input, based on user set criteria and/or as needed.
   c) a GUI offering a view of the JIT information:
      1) in a first display mode, non-intrusive, e.g., side-by-side with the user’s game session (for example, the system 700 may attempt to auto-position the reference stream at a moment that matches the current challenge);
      2) in a second display mode on “a second screen” (e.g., TV, mobile, and/or Google glass, among others); and/or
      3) in a third display mode “ghosted” (e.g., interleaved) on top of the user’s present view.

[0097] Certain representative embodiments including the first capability described herein may include any of the following:

   (1) for a representative system:
      a) a user may login to the game system and the dashboard may auto-generate to highlight players and/or game streams relevant (e.g., most relevant) at the moment (e.g., with updates subsequently occurring intermittently or periodically);
      b) a user may browse game streams and/or players by one or more attributes;
      c) a user may refine a search (e.g., by continuing to browse game streams and/or players by one or more attributes in a refined search), to compare players and/or streams, to drill-down on players and/or streams, and/or to bookmark players and/or streams, among others;
      d) the dashboard may be auto-generated and/or auto-updated based on user changes and/or system triggers; and/or
      c) the user may choose a game stream to watch, or a player with whom to interact, for example based on dashboard contents;

   (2) the dashboard may update and/or change style at any moment based on a trigger event (e.g., possible triggers for these changes, may include any of:
      a) the user, via user input, may specify new or updated patterns of interest and/or dashboard updates;
      b) the user may continue gaming and the user’s profile may be updated implicitly (e.g., the style and/or skill of the user) may change which may trigger changes to the dashboard (e.g., visual changes and/or substantive changes to the dashboard); and/or
      c) when current events (streamed) match user interests beyond some threshold, the dashboard may update, among others;

   (3) a mechanism (display and/or processing mechanism) to allow the dashboard (or other notifications) to be viewed in-game and across different platforms (e.g., mobile, desk and/or wearable devices) may include:
a) the dashboard appearing as an unobtrusive widget within the game; for example: (1) when the user is playing a game (e.g., in certain representative embodiments, the dashboard may auto-added a stream that may be relevant to the user’s current situation); and/or (2) a notification bar appearing overlaid on the game, informing the user of the new information that may help the user mitigate a current or imminent challenge (for example the user may view the update without taking his/her gaze from the game and the user may then click-through to view more details or ignore the notification); and/or
b) the dashboard appearing on a supplemental screen or a wearable device (e.g., a watch) which may be set via the user profile (and may be viewed, for example, as a condensed visual ribbon), or in heads-up display such as Google Glass as a summarized badge.

[0098] The dashboard may include any of the following information: (1) one or more indications of other players who are “trending” (for example, in terms of their contextual relevance to the given user); and/or (2) a list of other players about to reach the same or similar in-game challenges to the given user, and/or an estimation of when this might happen (for example, so that the given user may watch the other players at the appropriate time). The given user may auto-subscribe to one or more of these future events and when the event is imminent the live game-stream may be auto-played for the given user.

[0099] The visual notation used by the dashboard may be informative and/or compact to convey a priority and/or an imminence of key events (e.g., present and/or future events on the streams). In certain representation embodiments, the notification may be compact to allow a large number of streams to be visually monitored by the user via a computer screen (e.g., having a finite resolution). The compact visual notification may convey the time period in question and may make clear (using legends and/or callouts) how the icons and entities are related to the time dimension.

[0100] FIG. 8 is a diagram illustrating a layout of a representative dashboard 800.

[0101] Referring to FIG. 8, the representative dashboard 800 may be presented/displayed on a screen (e.g., a computer screen, touch screen, display and/or interface 810 and may include one or more player tracking widgets 820a, 820b and 820c (e.g., for tracking favorites, trends and upcoming alerts associated with one or more players of interest); a stream surveillance area 830 and/or other widgets/tracking areas, among others.

[0102] For example, parts of the computer screen/interface 810 may be used (e.g., at least momentarily) to show players activities and statistics. Another part of the screen (e.g., the bottom of the screen) may show a series of compact timeline ribbons. If a first user appears as a ribbon on a second user’s dashboard, a subset of the first user’s events may affect the ribbon of the first user in real-time to convey new situations. The dashboard may employ out-of-band systems such as text messages and/or sounds to convey information.

[0103] The user interface layout for the dashboard 800 and how multiple gameplay streams can be viewed at the same time in compacted (e.g., highly compacted) form is illustrated, for example using ribbons or bands. One or more ribbons and/or each ribbon (e.g., or band) may represent the changing (e.g., ever changing) events within a particular stream and those events may be represented by artifacts including, for
example, any of lines, bars, icons, and/or key frames, among others. It is contemplated that such artifacts and/or adornments on the ribbon may convey sufficient (e.g., enough specific) information regarding the ribbon to allow a user to decide whether to watch the stream, to request “similar streams”, and/or to ignore the stream, for example due to disinterest.

[0104] FIG. 9 illustrates details of representative user interface 900 for monitoring gameplay streams (that may be included in the stream surveillance area 830 of FIG. 8 or a main compact visual notation area 910). Referring to FIG. 9, the representative user interface 900 may include a plurality of ribbons 920. In certain representative embodiments, the ribbons or bands may be selectively positioned on the user interface 900 based on a sort order in accordance with the ribbon’s priority or importance level. The plurality of ribbons may be associated with a time dimensions, and may represent a given game stream/game sub-stream. The ribbon or band may be a compact notation and may allow many streams to be monitored at once. In certain representative embodiments, each stream may be represented by a ribbon or band and may scroll with time (e.g., game time). Different types (e.g., varying sorts) of visual indicators may be used to convey that particular in-game events have happened (or may be expected to happen). It is contemplated that the in-game events may include (1) game activity events such as kills, level changes, and/or player skill changes, among others; and/or (2) scoring events such as scoring rewards, life refresh events and rewards, and/or game score changes among others.

[0105] In FIG. 9, the inset box illustrates a number of possible stream rendering options A, B and/or C that may be included in a main ‘compact visual notation’ area 910 (depicted above it for one or more ribbons or bands of the streams). In the inset box, option A illustrates how the ebb and flow of (e.g., a selected one or more) in-game metrics (such as kills, progress, or other activities) could be partly represented as a line chart, or a line chart series (in the case of multiple metrics). Such a representation may convey sufficient (e.g., effectively convey enough) semantics to allow a viewer to determine when metrics peak (or zero out) and to take action such as: drill down to further metrics and/or a selection of a stream, for example for viewing. In another option B, in-game events may be demarcated with icons so that a horizontal stream becomes a stream of informative icons on which the viewer, when interested, can drill-down. For example, a series of ‘tombstone’ icons in close succession on the ribbon or band B (e.g., representative of a timeline) may indicate that the player in question is making lots of kills (e.g., above a threshold amount of kills) which may incite the viewers’ interest to watch this stream. Compact rendering option C may represent an alternative view in which small video keyframes may be embedded along a timeline (in temporal order). By clicking on a given keyframe, the keyframe may be viewed in detail. The progression of visual keyframes may provide coarse-grained but useful insight for the observer. In certain representative embodiments, one or more of these options A, B and/or C may be displayed at the same time. In certain representative embodiments, a user may select one or more of the options A, B and/or C for display and or may change between or among the options A, B and/or C via the user interface.

[0106] FIG. 10 is a diagram illustrating an alternate representative widget 1000 for displaying a matrix 1020 of live gameplay streams. FIG. 11 is a diagram illustrating user interface operations by which a stream in the alternate widget 1000 may be watched in detail by selecting a tile 1040 and/or by hovering over the
tile 1040 (e.g., for a threshold period). The tile 1040 may represent a single stream and may be updated based on time intervals and/or with in-game events. The grid 1020 may have a time length label.

[0107] Referring to FIG. 10, a tile 1040 of grid 1020 (e.g., each tile 1040 of the grid 1020) may be associated with an image icon of a key frame image of the game stream and/or a label (e.g., game name, player, and/or time, among others). When a mouse icon hovers over the grid 1020 at the tile 1040, the image and/or the video and text associated with the tile 1040 may be enlarged and/or may be played. In FIGS. 10 and 11, the tile 1040 (e.g., each tile or grid element) may be a small version of a live gameplay stream which, while small, may convey some information that may provide enough of a contextual clue to inspire an observer to drill-down to the associated stream. For example, by selecting tile 1040, the game stream or a game sub-stream associated with the tile 1040 may be displayed in an overlay 1120 in full detail or partial detail (e.g., with or without consolidated information (e.g., in-game contextual information)).

[0108] The grid element icons (e.g., each of the grid element icons, tiles and/or squares) may be updated over a period of time, for example at video playback rates (e.g., 24 times per second) or at a reduced frame rate (for example, in the range of about once per second to about 24 times per second).

[0109] FIG. 12 is a diagram illustrating a JIT display 1200 to present a game stream of interest to a spectator or a user. FIG. 13 is a diagram illustrating an operation to accept and cast a game stream to a separate screen.

[0110] Referring to FIG. 12, the JIT display 1200 may be provided on a computer screen/user interface 1210 and may include a user gameplay window 1220 in which one or more live or recorded gameplay windows 1230 may be added. The user gameplay window and the other gameplay windows 1230 may be presented adjacent to one another such that the user can study the other gameplay windows while (e.g., at the same time) playing the game G presented in the user game window 1220. The live or recorded gameplay windows 1230 may be determined and/or may be presented by the system as assistance for the in-game challenge facing the user in game G. The gameplay windows may morph (e.g., by changing size, for example proportionately, or by changing locations) (1) continuously, periodically, or based on a trigger condition (2) responsively and/or flexibly such that the user’s gaze need not leave (e.g., the user’s gaze may be maintained on) the game G, while the recorded or live gameplay P in the one or more live or recorded gameplay windows 1230 loads and/or is played.

[0111] Now referring to FIG. 13, the JIT display 1300 may be provided on a computer screen/user interface 1310 and may include a user gameplay window 1320. A separate computer screen/user interface 1330 may be provided and in communication with the system. The separate computer screen/user interface 1330 may display one or more live or recorded gameplay windows 1340. The user may accept watching suggested reference gameplay and may opt to cast the reference gameplay to the separate computer screen/user interface 1330 (for example to maintain focus and responsiveness with the presented gameplay).

[0112] The second capability set forth above, including the mechanism to watch live and/or recorded gameplay on-demand, the triggering mechanism for triggering a live stream that may be automatically
initiated when a given user is approaching a challenging part of the game and/or the GUI offering a view of the JIT information may include the following:

(1) in a first example, flexible auto-display gameplay (one of: live or recorded) on a JIT basis using a user’s current gameplay context as a reference. (For example, the auto-displayed gameplay may assist users through a level or challenge). The pre-condition for the auto-display gameplay may include user U, faced with a challenge C in game G. The user U having viewed the auto-display gameplay or consumed helpful streams (and/or parts of streams or live play), may makes decisions (e.g., better decisions) to mitigate his/her own in-game challenge C. An example scenario may include for user: U, game G) one or more of the following that: (a) the user U may be “stuck” at a challenging part of G; (b) the user U may hide (via invisibility feature or at a game location) or may freeze the game G (or otherwise pauses the game G); (c) the user U may request (e.g., ask the system) for help (and/or the system may anticipate that the user U may need help); (d) the system may find a live (or recorded) stream where gamers are in a similar (or an exact) situation in game G or in a related game F (where F might equal G) and user V) (the system may score the result for relevance and may display the score (it is contemplated that in various embodiments, the timeline may be scaled in such a way that the recorded stream may be displayed in log scale and/or in another nonlinear scaling process and that starting and ending timestamp labels may be displayed for the stream; (e) the user U may accept the idea of watching; (f) the gameplay video may execute (e.g., comes up) in side-by-side view (and/or on 2nd screen such as computer, television, phone, and/or watch, among others) for the user U to observe and learn from (in certain representative embodiments, metadata for user V and game F may appear; (g) the user U may dismiss the video and the user’s U focus may return completely to game G; (h) in certain representative embodiments, the user U may repeat the search, and/or (i) the user U may un-hide, un-freeze (or otherwise un-pause) the game and may continue the game, among others.

(2) in a second example, the user U may wish to find a moment within a recorded game-play stream that is helpful (e.g., most helpful) to her current in-game challenge, for example, to make learning and insights more efficient by cutting through the considerable ‘noise’ (text-form chatting, tangents, and/or irrelevant actions and techniques) that may be in stored gameplay videos. The pre-condition may include that user U, faced with a challenge C in the game G can select a gameplay video to consult. The system may assist the user in watching the correct portion of the video, for example saving time, and enabling the user U to more quickly learn mitigation for his/her challenge C in the game G. An example scenario may include a gamer assistance operation to auto-forward a recorded game video to the moment that is helpful (e.g., determined to be most helpful) to the user U. An example scenario may include one or more of the following that: (a) the user U may select a gameplay video V (for example, including game session information, e.g., encoding of the game, and session, events, among others) (in certain representative embodiments, the gameplay video V may be a ‘continuous
play’ from a beginning (e.g., the very beginning) of a gameplay session; (b) the system may load game metadata (e.g., including machine-readable metadata encapsulating game session information and/or the game storyline); (c) the system may load the user’s U machine readable profile; (d) in part by referring to loaded game events from the gameplay video’s V session, the system may derive or determine a series of points P1, P2, ..., Pn in the gameplay video V that are most relevant to the user’s U present situation.

[0113] In certain representative embodiments, the system may auto-forward to the determined points P1, P2 ... Pn in the gameplay video V. To determine or derive (e.g., get) the point P1, the system may compute the relative time R of the point P1 from the session start and may jump ahead R seconds into the gameplay video V; and/or (2) visually bookmark or otherwise demarcate a reference point (e.g., P1, P2, ..., Pn), for example, to give the user an idea of the number of reference points identified and/or to navigate on-demand to a selected reference point.

[0114] A series of jumps may be navigable by user gestures with the video or through a user interface, voice commands, and/or other means such as eye gazing operation or device manipulation. The user U may watch the relevant (e.g., only the most relevant) aspects of gameplay video V and may learn (e.g., more quickly learn) mitigation to his challenge(s).

[0115] In certain representative embodiments, methods, system and apparatus may be implemented that support visualization capabilities described herein.

**Representative Game Stream Processing**

[0116] Methods, apparatus and system for dynamic game stream processing and data repository operations to support JIT assistance functions may be implemented based on the disclosure herein. Certain representative embodiments support demarcation of game streams based on event patterns defined by one or more spectators or users. The event patterns may be recorded in the system as descriptors. The game event pattern may include any of the game event parameters such as player actions, game state transition, and/or spectator’s preferences. A reference pattern for a game may be provided by the game developer and may include a series of in-game event descriptors (for example including relative ordering with respect to each other) that describe the game story. These events may be grouped into sections or chapters (and/or using other arrangement) to convey further logical structure. Such a reference pattern may allow the system to match a given set of contiguous game events to a particular logical part of the game storyline.

[0117] The system may provide game independent stream metadata repository service interfaces and/or APIs to support indexing and/or matching (e.g., efficient indexing and matching) of sub-streams of one or more game streams between or among players and spectators. One, a plurality or each sub-stream of the game stream may include or contain at least two demarcation points with time stamps at a start and an end of the sub-stream. The sub-stream (e.g., each sub-stream) may have a metadata descriptor that may denote the event pattern that has occurred between the demarcation points. Additional demarcation points may be added (for example to support fast positioning to a specific moment within one or more sub-streams or as a part of the overall game storyline).
[0118] Detected event patterns may be recorded as part of the descriptors, for example, along with other game stream properties such as a game ID, a game state, a location and a time. For example, an event may include or may consist of a score, a score rate, a number of wins, a win rate, a failure rate, and/or the time used to pass a level. At a finer grain, a game event may include or consist of an action such as an “enemy” killed, a timestamp and game ID. An event pattern may include more than one parameter from one or more events that happen in parallel or in sequence (e.g., in a partial order). Event patterns may be triggered when game event data (e.g., parameter values) match criteria specified in the event pattern detection logic. When an event pattern is triggered, both the event pattern detection criteria and the value of the parameters in the events may be recorded as part of the demarcation descriptors for the game stream. It is contemplated that unlike the sequential video play back or spectating of an on-going game, the sub-streams denoted by demarcation points may be assembled by the system to provide multiple sub-stream playbacks or replays using sub-streams created and/or selected from one or more game streams played by the same or different players.

[0119] FIG. 14 is a diagram illustrating a game stream demarcation, indexing and data repository system 1400.

[0120] Referring to FIG. 14, the system 1400 may include: (1) a spectator component 1410; (2) a game server 1420; (3) a player component 1430; (4) a JIT assistance component 1440; (5) a profiler component (e.g., a real-time and/or behavior profiler component) 1450; (6) a demarcation, indexing and linking component (e.g., a game sub-stream demarcation, indexing and linking component) 1460; (7) a detection component (e.g., an event pattern detection component) 1470; and/or (8) a data repository 1480 (e.g., a metadata and/or meta-rule repository, a database and/or storage device), among others. Each component may enable certain functions, and/or operations.

[0121] The system 1400 may provide meta-rule processing operations and a repository to support flexible and customized detection and generation of metadata for demarcation points. The system 1400 may link the metadata with the physical game stream service entry points. For example, the game stream and/or sub-stream (or segment) marked by demarcation points may be defined by the first and the last events in the event pattern plus time intervals (e.g., predefined time intervals) before and after the first and last matching events. Additional application specific attributes such as specific game state of interest to particular application (e.g., avatar and weapon type) may be added to the descriptor. These attributes may be generated on the fly (e.g., in real time or near real time) and/or by post processing of the game streams using application specific meta-rules with special functions such as avatar motion trajectory analysis, activity and path mapping, and/or text chat semantic filtering, among others.

[0122] The system 1400 may include or consist of components (e.g., functional and/or operational components) in the spectator client 710 and/or the player client 730 to support spectating features. The system 1400 may offer an immersive in-game experience. The immersive features may be supported partly by an existing spectator mode and possessive mode SDKs provided by a game engine (e.g., game control and graphics engine 720) and partly by the JIT playback or the JIT replay of sub-streams (e.g., via a JIT assistance component 1440) supported by the demarcation and indexing operations of the demarcation,
indexing and linking component 1460. The indexing function of the demarcation, indexing and linking component 1460 may take the outputs of the profiler component 1450 (e.g., the real-time profiler module/function/component) and the detection component 1470 (e.g., the game event pattern detection module/function/component) to decide or determine the demarcation points and to generate the index used for fast search and recommendation.

[0123] For example, the demarcation, indexing and linking components 1460 may use meta-rules to process the metadata output from the detection component 1470 (e.g., the event pattern detection component/module). The demarcation, indexing and linking component 1460 receives the meta-rules (e.g., from the data repository) and metadata (e.g., pattern matching events) generated by the event pattern detection component 1470 and other metadata (e.g., user behavior data), for example from the profiler component 1450 to generate demarcation points on sub-streams of interests to the players and/or spectators. The following example illustrates workflow between the modules/functions/components described in FIG. 14 that may be defined in meta-rules to create immersive experience for the spectators and/or JIT assistance to players on detecting a moment (e.g., contextual relevant or critical moment) in the game stream.

[0124] The inputs (and/or background operations) to the workflow include: (1) an assessment by the profiler component 1450 of the skill level of player and/or experience of spectators and/or players; and/or (2) monitoring of the game stream by the event pattern detection component 1470.

[0125] The system 1400 may enable detection of any of the following composite event patterns that may define a moment (e.g., relevant and/or critical moment) in a multi-player game (e.g., to defend the base of allies in the multi-player game) that may be of interest to multiple spectators. For example, the system 1400 may detect a pattern that: (1) a percentage (e.g., 90%) of allies’ bases have been destroyed by powerful monsters; a percent (e.g., 90%) of enemy bases have been destroyed; and/or (2) the current health of base X is at a level (e.g., 30%) and that allies are out-numbered, among many others.

[0126] The meta-rule actions that may be triggered by the composite event patterns may (1) invite skillful spectators to join and/or possess the allies’ avatars to help protect the base; (2) invite entertaining spectators to possess either the enemy or the allies; (3) enable spectators to inject fire power to possessed avatars; (4) enable spectators to vote for replaying a turning point (e.g., critical turning point).

[0127] In parallel or in serial, the system 1400 may perform actions or additional actions to process the game stream and/or to monitor usage of the game sub-streams by spectators and/or players. These actions may include:

1. storing the number of spectators joining the game and/or the possessed avatars;
2. marking demarcation points on game sub-stream for particular events or each event that resulted in a partial match of the composite event patterns;
3. tracking demarcation points (e.g., all demarcation points) for game sub-streams (e.g., all game sub-streams) or for game sub-streams of interest for the spectator and/or player (e.g., each spectator and/or each player);
(4) recording the game streams (video, chat, actions, and/or game state frames, among others) that include or contain marked demarcation points into game stream service entry points and/or storing the game stream in the data repository 1480;

(5) recording demarcation point descriptors and links to game sub-streams in the data repository 1480;

(6) recording the behavior patterns of players and/or spectators for context and behavior (e.g., skill) aware JIT assistance in the data repository 1480.

(7) building an index for demarcation point descriptors, event patterns, game IDs, game sessions, and/or other application specific game stream attributes.

[0128] In certain representative embodiments, the system 1400 may implement methods, function, modules and operations for efficient content feature extraction and indexing, for example, to support “teleportation” of players and/or spectators to a past game stream or a future game stream. A user (player or spectator) may be queued in a wait-list for the particular game session (e.g., an expert for a difficult race track or strategy to overcome a challenge in a particular game session) to happen in the future. When the game session reaches the point that the user is waiting for, the user may be notified and may be activated to watch the game session. The JIT operation, function and/or module may support personalized and context aware gaming video recommendation (e.g., with a consideration to popularity, interest and diverse, among others of the expert or context aware gaming video recommendation).

[0129] In certain representative embodiments, the system 1400 may implement methods, function, modules and operations for open and flexible interfaces to activate and/or download sub-streams of composite game streams using the service entry points stored in the metadata and meta-rule repository 1480. The user may have options to replay multiple sub-streams of game streams concurrently or serially. For example, the user may desire to compare different strategies and weapons chosen by skilled players in different stage of games (e.g., for defeating different monsters).

[0130] In certain representative embodiments, the system 1400 may implement methods, function, modules and operations for efficient voting for actions from multiple spectators 1410 (e.g., via a spectator client 710) to influence the course of the game in real-time. A player (e.g., via the player client 1430) may provide options at different demarcation points for spectators (via the spectator client 710) to vote for the next action to be taken. When more than one spectators provide inputs to vote on the options (e.g., within a time limit) one of the option may be selected based on, for example, the total number of votes or the total number of votes from friends (or priority spectators), among others. Actions may be whether to replay the game by the player or choosing a different path, using a different method and/or a different weapon to replay the game session. A player may invite spectators with better skill levels to help with playing a difficult part of the game. For example, the player may allow the spectators to act as an on-line coach to control the action of an avatar together with the player (e.g., enabling spectator and player interactions). For example, the spectator and player may split different types of functions and/or a particular function may be controlled by the spectator. Players may adjust the voting weights among one or more spectators and other players.
In certain representative embodiments, the system 1400 may implement a game stream sub-stream metadata and meta-rule descriptor repository. The game stream sub-stream metadata and meta-rule descriptor repository may include or consist of various metadata used to support game stream demarcation indexing operations. Meta-rules may be defined by developers or service providers using a meta-rule template. The meta-rule template may include or contain stored method and logic that may be executed by the game sub-stream demarcation, indexing and linking component 1460.

Examples of representative descriptors may include:

1. game sub-stream and demarcation point descriptors including: (a) DemarcationIDs, (b) Game Types, (c) Task IDs, (d) Sub-task IDs, and/or (e) Timestamps (e.g., the descriptors may link to service entry point URI of a game sub-stream), among others;

2. event pattern defined for the demarcation point by spectators or players and their descriptors and/or parameters including: (a) PatternID, (b) userID, and/or (c) event pattern parameters such as {{StateTransitions | Player behavior | other in-game event parameters}, time stamps, in-game location, completion time, scores}, among others;

3. meta-rule templates and descriptors for JIT assistance service including: (a) Meta-rule ID (e.g., to link to the composite pattern and action rule template); (b) Links:{{LinktoActiveSpectatorList | LinktoActivePlayersList}; (c) ServiceEntryPoints: {{SubSectionID, {DemarcationPoints}}}, among others; and/or

4. player and spectator publishing, and subscription usage records including (a) subscription registry: {{playerID | spectatorID}, sub-streamID} and/or (b) publishing registry: {sub-streamID, descriptors}, among others

In certain representative embodiments, the system 1400 may implement methods, function, modules and operations to: (1) generate and maintain usage record: {{SpectatorID | playersID}, {{watched | possessed | voted}, sub-streamID, usage, other attributes}}; (2) enable dynamic time scale adjustment and injection of in-game actions to possessed players. (This function may be implemented using the in-game possession feature provided by the game engine 720 via, for example the game server 1420 (e.g., Possess Pawn in Unreal Engine) for one or more spectators to immerse in one or more players in popular game sessions). For example, the spectator via the spectator client 720 may have the same camera view as the players’ avatar and may experience the immersive actions. The spectator may control the time scale to replay and/or slow down the action replay. This operation may be accomplished by controlling the replay speed and/or actions during the replay of the game stream animation sequence and the state of the recorded game streams such that the outcome may be altered based on a new skill learned from previous mistakes.

Representative JIT Assistance Services

FIG.15 is a diagram of a context and behavior aware game recommendation service 1500.

Based on demarcation and profiling results, the system 1400 may perform recommendation services (e.g., efficient recommendation services). The services may include user preference analysis, stream analysis, user-stream matching, and/or result preparation, among others (for example, to return a hyper-link graph which may match and display portions of game sub-streams from one or more game
streams). Referring to FIG. 15, a user may preform activities which may be monitored and the monitored data may be sent to a user preference profiling module at block 1520, for example to track the user’s activities as disclosed herein. In-game streams for various users may be monitored. The in-game streams and/or a keyword pool (e.g., that includes one or more keywords) may be sent to a stream demarcation profiling module, at block 1550. A sub-stream may be described by multiple keywords according to events that are associated with the sub-stream. The stream demarcation and profiling module at block 1550 may looks into (and/or analyze) the event sequence of streams and may generate the markers for timestamps (e.g., important timestamps).

[0136] By the demarcation process, the stream may be divided and/or segmented into sub-streams. For example, each subsection may be described by multiple keywords according to its respective events. The keyword pool can be generated and updated by the gaming community or a game company. The profiled users and stream sub-sections may be fed into (e.g., send to) a stream subsection (e.g., user-stream) matching engine, at block 1560. The matching engine at block 1560 may find the stream sub-sections which may be relevant to user preferences. The system, at block 1570, may prepare a hyper-line graph as a result which may include or consists of multiple stream sub-sections.

Representative User Preference Profiling

[0137] Referring back to FIG. 14, the system 1400 may include a profiling module/function, for example performed by the profiler component, that may be associated with user preferences based on observed and/or measured user activities. The categories of information that may be inferred from user activities include: (1) watching objective, (2) interest keyword; and/or (3) watching habit, among others.

[0138] Watching objective may show users’, for example, the goal associated with watching the gameplay. For example, users may watch for entertainment or to seek coaching. Interest keyword may show users’ interests in specific streams. For example, users may be interested in famous player, competition, and certain maps. Watching habit may show users’ habit associated with watching the gameplay. For example, users may watch a stream for an hour or for just 10 minutes.

[0139] The profiling of user preferences may extract such information from past watching activities. Diversity of stream watching may show the watching objective. High frequent keywords associated with a stream may show user interest in the stream. Average watching length may show the watching habit. Once the preferences are profiled for users, they may be ready for the stream matching engine.

Representative Stream Demarcation and Profiling

[0140] In the system 1400, event sequences may be available for one or more streams (e.g., every stream). Based on such event sequences, the system 1400 may analyze the stream and may discover what is happening in the stream. The following is a representative sample of an event sequence in a stream and includes:

(1) Level start: Level 2, difficulty hard
(2) Events...
(3) Boss 1: Finish time 10 min
(4) Events...
(5) Boss 2: Finish time 5 min
(6) Level end: Success, Point 90

[0141] “Events” may indicate the events which are included in the event sequence but not relevant for certain demarcation and profiling.

[0142] Demarcation may be the first processing for a stream and, for example may be used to extract one or more interesting, relevant and/or important sub-sections of the stream and to generate demarcation markers at particular timestamps. For example, by interpreting the above example event sequence, two stories (e.g., important stories) may be determined and/or discovered in the stream including the challenge of Boss 1 and the challenge of Boss 2. The demarcation operation/process may identify the relevant events and may generate and place two markers (a start marker and an end marker) at specific timestamps for each of the stories. For challenge of Boss 1, the demarcation may generate a marker at 2 min 46 sec for the start timestamp and 13 min 02 sec for the end timestamp. This story will be label by “Boss 1” with timestamp markers.

[0143] From the demarcation operation/process, a number of sub-sections of streams may be obtained. Each of the sub-streams may be associated with a story and provided a label. Profiling of each or some of the sub-section of the stream may be a second process. Different players may adopt different skills and different strategies, for example to defeat the same boss, which may result in different performances for those players. For example, for the “Boss 1 challenge”, the game events may be different in different stream and for different players. The system 1400 may interpret the events and detect various game patterns. Some “Boss 1 challenge” events may be finished in shorter than the average time. Some “Boss 1 challenge” events may be performed by a famous player. By attaching multiple detected keyword to every sub-section of the stream, the system 1400 is able to profile the streams.

[0144] After segmenting the game stream, the game stream descriptor may be stored in the data repository 1480 as shown in FIG. 14. User preferences may be tracked and/or inferred by the system 1400 based on searching and watching history. User preferences may be stored in player and spectator profiles in the data repository 1480.

Representative Game Stream Recommendation

[0145] The system 1400 may provide advanced game stream segment recommendations based on progression of one or more behavior attributes over one or more time intervals to capture changes in interests and needs of spectators and/or players. Resources of game animation sequences and/or video clips may be made available to spectators by a large number of players. Personalized recommendation of game streams may be useful and/or meaningful to keep a player’s interest in a game.

[0146] Different strategies for recommendations may be established based on the needs of players. Players may seek game segments for: (1) solving their difficulties; (2) following expert player activities; (3) viewing interesting plays; and/or (4) randomly watching gameplay.

[0147] Game segments may be represented by a stream of events. Based on the watching history of the players, the player’s preferences may be determined. Matching the player preferences and game segment descriptor may produce effective recommendations. In certain representative embodiments the current state
of a player in a game may be determined/located and game stream segment at the same state (and/or a substantially similar state) may be recommended by the system to provide coaching information to the player.

[0148] A behavior context aware real-time recommendation subsystem may recommend gameplay to users by incorporating user and gameplay profiles. The background activities and/or inputs to this subsystem may include: (1) for a user: (a) watching history including providing user preference on general watching; (b) gaming difficulty including providing the user’s current needs; and/or (c) watching habit including watching frequency and watching length, among others, and/or (2) for game video clips (a) game name, clips game context (including level and/or stage); (b) topic (for example, "hard monster challenge", “finals in gaming competition”) and/or (c) Author (record by famous players, for example). The output of this subsystem may include a set of partial ordered links to sub-streams and demarcation points prepared and stored in the data repository 1480 (e.g., a database, for example for the spectator and player client GUI and API to access.

[0149] Data model descriptions examples may include any of the following: (1) watching history: the series of gameplay users have watched (e.g., every user has watched); (2) gaming difficulty including {userID:X, difficult game:Y, difficult Lv:Z, timestamp:TTT}; (3) watching habit including {userID:X, interest topic:K, interest game:W, interest player:U}; (4) gameplay labels including {gameID:X, game Lv:Y, virtual location:L}; (5) topic including {tags: Wow, PvP, World champion semi-final, Teamname} and/or (6) Author name including {player:Mike, timestamp:TT, category:solo}.

[0150] FIG. 16 is flowchart illustrating a representative method of selecting one or more game streams.

[0151] Referring to FIG. 16, the representative method 1600 may include a determination at block 1610 and/or a selection at block 1620. At block 1610, a processor 634, 652 and/or 664 may determine one or more in-game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest. At block 1620, the processor 634, 652, or 664 may select the one or more game streams relevant to the game stream of interest or the game user of the game stream of interest based on the in-game contextually relevant metrics.

[0152] In certain representative embodiments, a transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may receive, via a plurality of game devices 102, 610, 650 and/or 670, a plurality of game streams. The received plurality of game streams may be stored and/or collected using the processor 634, 652 and/or 664 in a storage device 638, 654, 656, 666, and/or 668 (e.g., disk and/or memory, among others).

[0153] In certain representative embodiments, a transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may send to the game device 102, 610, 650 and/or 670 one of: (1) the selected one or more game streams or (2) one or more identifiers for identifying the selected one or more game streams.

[0154] In certain representative embodiments, a transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may receive from the game device 102, 610, 650 and/or 670 a message requesting selection of the one or more game streams.
[0155] In certain representative embodiments, the game device 102, 610, 630, 650 and/or 670 may be wired or wireless and may be a game server 630 and/or 650 or may be an end user device 102, 610 and/or 670.

[0156] In certain representative embodiments, the processor 634, 652 and/or 664 may determine metrics indicative of any of: (1) in-game challenges; (2) in-game situations; and/or (3) in-game performance.

[0157] In certain representative embodiments, the processor 634, 652 and/or 664 may determine a set of the game streams relevant to an in-game challenge or an in-game situation associated with the game stream of interest; and may select the one or more game streams from the determined set of game streams based on one or more in-game performance metrics associated with the game stream of interest.

[0158] In certain representative embodiments, the processor 634, 652 and/or 664 may, for a set of the game streams: compare any of: an in-game challenge, an in-game situation or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams. The processor 634, 652 and/or 664 may automatically select the one or more game streams based on the comparison.

[0159] In certain representative embodiments, the processor 634, 652 and/or 664 may, for a set of the game streams: compare any of: an in-game challenge, an in-game situation or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams to determine relevancy of the respective game stream. The transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may send, to the game device 102, 610, 650 and/or 670, an indication of the determined relevancy.

[0160] In certain representative embodiments, the processor 634, 652 and/or 664, for a respective game stream of the one or more game streams: (1) may demarcate one or more game streams (e.g., a respective game stream or each respective game stream) with indicators that indicate a contextually relevant context of the respective game stream; (2) may index the respective game stream at timepoints associated with the demarcated indicators; and/or (3) may establish a rank of the respective game stream or game streams based on the contextually relevant context associated with the demarcated indicators.

[0161] In certain representative embodiments, a storage device 638, 654, 656, 666, and/or 668 may store any of: (1) the indicators; (2) the timepoints; or (3) the rank of the respective game stream, as metadata associated with the respective game stream.

[0162] In certain representative embodiments, the transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may send to a game device the metadata associated with the one or more game streams.

[0163] In certain representative embodiments, the processor 634, 652 and/or 664, for a set of the game streams: may determine synchronization information to synchronize one or more portions of the selected game stream with the game stream of interest; and may send to a game device 102, 610, 650 and/or 670,
the synchronization information to synchronize the one or more portions of the selected game stream with the game stream of interest for presentation to a game user.

[0164] In certain representative embodiments, the transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may receive any of: game behavior information and/or game skill information associated with one or more game users. The processor 634, 652 and/or 664 may select at least one game stream of the one or more game users based on the received game behavior information or the received game skills information and/or may retrieve the selected at least one game stream. The transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may send to a game device 102, 610, 650 and/or 670, the selected at least one game stream.

[0165] In certain representative embodiments, the transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may receive a profile associated with in-game performance of the game user. The processor 634, 652 and/or 664 may determine other game users or game streams that at least partially match the received profile.

[0166] In certain representative embodiments, the transmit/receive unit 632 and/or wired or wireless adaptor 658 and/or 662 may send, to a game device 102, 610, 650 and/or 670, any of: (1) information associated with the determined other users or game streams that at least partial match the received profile; or (2) one or more game streams that at least partial match the received profile.

[0167] FIG. 17 is flowchart illustrating a representative method of presenting game streams.

[0168] Referring to FIG. 17, the representative method 1700 may include, at block 1710, a game device 102, 610, 630, 650 and/or 670 obtaining via a game server 630, 650 and/or 660 (or a 3rd party service), game streams that are contextually relevant to a game stream of interest and in-game information associated with the contextually relevant game streams. At block 1720, the game device 102, 610, 650 and/or 670 may present (or may provide information for the presentation (e.g., to the user)) a dashboard of the contextually relevant game streams and in-game information, as a plurality of ribbons.

[0169] In certain representative embodiments, the processor 118, 614, 634, 652, 664 and/or 674 may establish a rank for a respective ribbon of the plurality of ribbons based on the in-game information, and may order the plurality of ribbons for presentation based on the established rank.

[0170] In certain representative embodiments, the processor 118, 614, 634, 652, 664 and/or 674 may select from one of the plurality of ribbons presented on the dashboard, at least one of the contextually relevant game streams; and may present (e.g., may cause a display unit to display) the selected contextually relevant game stream or streams with in-game information, as one or more assistance game streams.

[0171] In certain representative embodiments, the processor 118, 614, 634, 652, 664 and/or 674: (1) may demarcate a respective one of the assistance game streams with indicators that indicate at least one contextually relevant context of the respective one of the assistance game streams; (2) may index the assistance game stream at timepoints associated with the demarcated indicators; (3) may establish a rank of the demarcated indicators based on the contextually relevant context associated with the demarcated indicators; and/or (4) may present any of: rank information or index information associated with the
demarcated indications via a user interface (for example, user interface 616, 710, 800 and/or 900, among others).

[0172] In certain representative embodiments, the user interface 616, 710, 800 and/or 900 may present, based on user input, a respective assistance game stream started at one of the indexed timepoints for the respective assistance game stream.

[0173] In certain representative embodiments, the processor 118, 614, 634, 652, 664 and/or 674 for a plurality of assistance game streams may determine a relevancy of a respective assistance game stream, and/or may generate a visual indication of the determined relevancy. The user interface 616, 710, 800 and/or 900 may display the generated visual indications with the respective assistance game streams such that via user input based on the visual indications of the determined relevancy, the processor 118, 614, 634, 652, 664 and/or 674 may select a game stream (e.g., for presentation).

[0174] In certain representative embodiments, the visual indication may include a ribbon based presentation of any of: (1) a trend of an in-game performance metric; (2) an in-game situation or (3) a visual of an in-game challenge.

[0175] FIG. 18 is flowchart illustrating another representative method of presenting game streams.

[0176] Referring to FIG. 18, the representative method 1800 may include, at block 1810, a game device 102, 610, 650 and/or 670 obtaining via a game server 630, 650 and/or 660 (or a 3rd party service), an assistance game stream that is contextually relevant to a game stream of interest and in-game performance information associated with the assistance game stream. At block 1820, a user interface 616, 710, 800 and/or 900 may presenting, on a display, a portion of the assistance game stream based on the in-game performance information.

[0177] In certain representative embodiments, the transmit/receive unit (and/or transceiver) 120, 612, 632 and/or wired or wireless adapter 558 and/or 672 may receive from a game server 630, 650, 660 and/or 3rd party services 680 synchronization information to synchronize the portion of the assistance game stream with the game stream of interest for presentation to the user such that the portion may be presented just prior to or at the same time as a corresponding portion of the game stream of interest based on the in-game performance information.

[0178] In certain representative embodiments, the user interface 616, 710, 800 and/or 900 may contemporaneously present, based on user input, the game stream of interest and the portion of the assistance game stream to the user.

[0179] In certain representative embodiments, the user interface 616, 710, 800 and/or 900 may continue to present the game stream of interest, after the portion of the assistance game stream ends.

[0180] In certain representative embodiments, the user interface 616, 710, 800 and/or 900 may present the portion of the assistance game stream contemporaneously with the game stream of interest as one of: (1) in a side-by-side view along with the game stream of interest; (2) on a different display from the game stream of interest; or (3) as an overlay on over and/or on top of the game stream of interest.

[0181] FIG. 19 is flowchart illustrating a representative method of managing one or more game streams.
Referring to FIG. 19, the representative method 1900 may include, at block 1910, a processor 118, 614, 634, 652 and/or 674 of the game device 102, 610, 630, 650 and/or 670 determining a game stream of interest. At block 1920, the transmit/receive unit (and/or transceiver) 120, 612, 632 and/or wired or wireless adaptor 658 and/or 672 may send to a game server 630, 650, 660 or the 3rd party service 680 one or more in-game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest. At block 1930, the transmit/receive unit (and/or transceiver) 120, 612, 632 and/or wired or wireless adaptor 658 and/or 672 may receive information identifying one or more assistance game streams relevant to the game stream of interest or the game user of the game stream of interest based on the in-game contextually relevant metrics. At block 1940 the transmit/receive unit (and/or transceiver) 120, 612, 632 and/or wired or wireless adaptor 658 and/or 672 may send to a game device 102, 610, 630, 650 and/or 670 information to present the game stream of interest and the one or more assistance game streams relevant to the game stream of interest.

[0182] FIG. 20 is flowchart illustrating a representative method of processing one or more game streams.

[0183] Referring to FIG. 20, the representative method 2000 may include, at block 2010, the processor 634, 652 and/or 664 of the game server 630, 650 and/or 660 or the 3rd party service 680 collecting from a plurality of game devices 102, 610, 630, 650 and/or 670, game streams and metadata associated with the game streams. At block 2020, the processor 634, 652 and/or 664 may process the plurality of game stream and the associated metadata to determine in-game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest.

[0184] In certain representative embodiments, the processor 634, 652 and/or 664 of the game server 630, 650 and/or 660 or the 3rd party service 680 may: (1) receive (e.g., via a corresponding transmit/receive unit) from a respective game device 102, 610, 630, 650 and/or 670, in-game information associated with a game stream of interest; (2) determine from the in-game information associated with the game stream of interest in-game contextually relevant metrics associated with the game stream of interest; (3) may select one or more collected game streams based on comparisons of the in-game contextually relevant metrics associated with the game stream of interest and the collected game streams; and (4) send (e.g., via a corresponding transmit/receive unit) to the respective game device 102, 610, 630, 650 and/or 670 the selected game streams.

[0185] FIG. 21 is flowchart illustrating another representative method of processing one or more game streams.

[0186] Referring to FIG. 21, the representative method 2100 may include, at block 2110, a game device 630 and/or 650 sending game streams and metadata associated with the game streams. At block 2120, the game device 630 and/or 650 may receive selected game streams and contextually relevant in-game metadata. At block 2130, the game device 630 and/or 650 may send a user device 102, 610 and/or 670 the selected game streams and contextually relevant in-game metadata for presentation by the user device 102, 610 and/or 670 of the selected game streams.

[0187] A representative game server 630, 650, 660 or the 3rd party service 680 (e.g., configured to select one or more collected game streams) may include a processor configured to: determine one or more in-
game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest; and select the one or more game streams relevant to the game stream of interest or the game user of the game stream of interest based on the in-game contextually relevant metrics.

[0188] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to receive, via a plurality of game devices 102, 610, 630, 650 and/or 670, a plurality of game streams, and a storage unit configured to store the plurality of game streams.

[0189] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to send to a game device 102, 610, 630, 650 and/or 670 one of: (1) the selected one or more game streams or (2) one or more identifiers for identifying the selected one or more game streams.

[0190] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to receive, from a game device 102, 610, 630, 650 and/or 670, a message requesting selection of the one or more game streams, wherein the game device 102, 610, 630, 650 and/or 670 is another game server or an end user device.

[0191] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to determine the in-game contextually relevant metrics that are indicative of any of: (1) in-game challenges; (2) in-game situations; or (3) in-game performance.

[0192] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to determine a set of the game streams relevant to an in-game challenge or an in-game situation associated with the game stream of interest; and select the one or more game streams from the determined set of game streams based on one or more in-game performance metrics associated with the game stream of interest.

[0193] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to: for a set of the game streams: (1) compare any of: an in-game challenge, an in-game situation or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams; and automatically select the one or more game streams based on the comparison.

[0194] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to, for a set of game streams compare any of: an in-game challenge, an in-game situation and/or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams to determine relevancy of the respective game stream.

[0195] A transmit/receive unit of the game server 630, 650, 660 or the 3rd party service 680 may be configured to send to the game device 102, 610, 630, 650 and/or 670 an indication of the determined relevancy.

[0196] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to, for a respective game stream of the one or more game streams: demarcate the respective game stream with indicators that indicate a contextually relevant context of the respective game stream; index the respective game stream at timepoints associated with the demarcated indicators; and/or establish a rank of the
respective game stream based on the contextually relevant context associated with the demarcated indicators.

[0197] The game server 630, 650, 660 or the 3rd party service 680 may include a storage unit configured to store any of: (1) the indicators; (2) the timepoints; or (3) the rank of the respective game stream, as metadata associated with the respective game stream.

[0198] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to send to a game device 102, 610, 630, 650 and/or 670 the metadata associated with the one or more game streams.

[0199] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to determine synchronization information to synchronize one or more portions of the selected game stream with the game stream of interest.

[0200] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to send to a game device 102, 610, 630, 650 and/or 670 the synchronization information to synchronize the one or more portions of the selected game stream with the game stream of interest for presentation to a game user.

[0201] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to receive any of: game behavior information or game skill information associated with one or more game users.

[0202] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to: select at least one game stream of the one or more game users based on the received game behavior information or the received game skills information; retrieve the selected at least one game stream; and/or send to a game device 102, 610, 630, 650 and/or 670 the selected at least one game stream.

[0203] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to receive a profile associated with in-game performance of the game user.

[0204] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to determine other game users or game streams that at least partially match the received profile.

[0205] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to send to a game device 102, 610, 630, 650 and/or 670 any of: (1) information associated with the determined other users or game streams that at least partial match the received profile; or (2) one or more game streams that at least partial match the received profile.

[0206] A representative game device 102, 610, 630, 650 and/or 670 (e.g., configured to present game streams) may include a processor configured to obtain, via a game server 630, 650, 660 or the 3rd party service 680, game streams that are contextually relevant to a game stream of interest and in-game information associated with the contextually relevant game streams; and a presentation unit configured to present a dashboard of the contextually relevant game streams and in-game information, as a plurality of ribbons.
[0207] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to establish a rank for a respective ribbon of the plurality of ribbons based on the in-game information; and order the plurality of ribbons for presentation based on the established rank.

[0208] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to select, from one of the plurality of ribbons presented on the dashboard, at least one of the contextually relevant game streams.

[0209] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to present the selected contextually relevant game stream or streams with in-game information, as one or more assistance game streams.

[0210] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to: demarcate a respective one of the assistance game streams with indicators that indicate at least one contextually relevant context of the respective one of the assistance game streams; index the assistance game stream at timepoints associated with the demarcated indicators; and/or establish a rank of the demarcated indicators based on the contextually relevant context associated with the demarcated indicators.

[0211] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to present any of: rank information and/or index information associated with the demarcated indications via a user interface.

[0212] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to present, based on user input, a respective assistance game stream started at one of the indexed timepoints for the respective assistance game stream.

[0213] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to: for a plurality of assistance game streams, determine a relevancy of a respective assistance game stream, and generate a visual indication of the determined relevancy.

[0214] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to display the generated visual indications with the respective assistance game streams.

[0215] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to: select, via user input based on the visual indications of the determined relevancy, a game stream.

[0216] The visual indications may include a ribbon based presentation of any of: (1) a trend of an in-game performance metric; (2) an in-game situation or (3) a visual of an in-game challenge.

[0217] Another representative game device 102, 610, 630, 650 and/or 670 (e.g., configured to present game streams) may include a processor configured to: obtain, via a game server 630, 650, 660 or the 3rd party service 680, an assistance game stream that is contextually relevant to a game stream of interest and in-game performance information associated with the assistance game stream; and a display unit configured to present a portion of the assistance game stream based on the in-game performance information.

[0218] The game device 102, 610, 630, 650 and/or 670 may include a transmit/receive unit configured to receive, from a game server 630, 650, 660 or the 3rd party service 680, synchronization information to synchronize the portion of the assistance game stream with the game stream of interest for presentment to
the user such that the portion is presented just prior to or at the same time as a corresponding portion of the game stream of interest based on the in-game performance information.

[0219] The display unit of the game device 102, 610, 630, 650 and/or 670 may be configured to contemporaneously present, based on user input, the game stream of interest and the portion of the assistance game stream to the user.

[0220] The display unit of the game device 102, 610, 630, 650 and/or 670 may be configured to end a presentation of the portion of the assistance game stream, and continue to present the game stream of interest, after the portion of the assistance game stream ends.

[0221] The game device 102, 610, 630, 650 and/or 670 may include a presentation unit configured to present the portion of the assistance game stream contemporaneously with the game stream of interest as one of: (1) in a side-by-side view on a display along with the game stream of interest; (2) on a different display from the game stream of interest; or (3) as an overlay on top of the game stream of interest.

[0222] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to for each respective assistance game stream: (1) demarcate the respective assistance game stream with indicators that indicate at least one contextually relevant context of the respective assistance game stream, (2) index the respective assistance game stream at timepoints associated with the demarcated indicators, and (3) rank the respective assistance game stream based on the contextually relevant context associated with the demarcated indicators.

[0223] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to present any of: rank information or index information associated with the demarcated indications via a user interface.

[0224] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to for each respective ribbon of the plurality of ribbons, generate a visual indication of a relevancy of an associated contextually relevant game stream based on the in-game information.

[0225] The presentation unit of the game device 102, 610, 630, 650 and/or 670 may be configured to display the generated visual indication in the respective ribbon for the plurality of ribbons.

[0226] The processor of the game device 102, 610, 630, 650 and/or 670 may be configured to select, via user input based on the generated visual indications, a selected game stream for presentation.

[0227] A further representative game device 102, 610, 630, 650 and/or 670 (e.g., configured to manage one or more game streams) may include a processor configured to determine a game stream of interest, a transmit/receive unit configured to: (1) send to a game server 630, 650, 660 or the 3rd party service 680 any of: (i) in-game information; or (ii) one or more in-game contextually relevant metrics associated with any of: (a) the game stream of interest or (b) the game user associated with the game stream of interest; (2) receive any of: (i) one or more assistance game streams; and/or (ii) information identifying the one or more assistance game streams relevant to the game stream of interest or the game user; and (3) send, to a game device 102, 610, 630, 650 and/or 670, (i) the one or more assistance game streams relevant to the
game stream of interest and (ii) information to present the game stream of interest along with the one or more assistance game streams relevant to the game stream of interest.

[0229] A still further representative game server 630, 650, 660 or the 3rd party service 680 (e.g., configured to select one or more game streams) may include a processor configured to: (1) collect from a plurality of game devices 102, 610, 630, 650 and/or 670 game streams and metadata associated with the game streams; (2) determine a game stream of interest; and/or (3) process the plurality of game stream and the associated metadata to determine in-game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest.

[0230] The game server 630, 650, 660 or the 3rd party service 680 may include a transmit/receive unit configured to receive from a respective game device 102, 610, 630, 650 and/or 670, a game stream of interest or in-game information associated with a game stream of interest.

[0231] The processor of the game server 630, 650, 660 or the 3rd party service 680 may be configured to: determine from the game stream of interest or the in-game information associated with the game stream of interest, in-game contextually relevant metrics associated with the game stream of interest, and select one or more collected game streams based on comparisons of the in-game contextually relevant metrics associated with the game stream of interest and the collected game streams.

[0232] The transmit/receive unit of the game server 630, 650, 660 or the 3rd party service 680 may be configured to send to the respective game device 102, 610, 630, 650 and/or 670, the selected game streams.

[0233] It is contemplated that the 3rd party video services 680 may provide some or all of the services/operations/functions of the Reconnaissance and Assistant Services function modules 660, for example as a cloud-based service.

[0234] Although features and elements are described above in particular combinations, one of ordinary skill in the art will appreciate that each feature or element can be used alone or in any combination with the other features and elements. In addition, the methods described herein may be implemented in a computer program, software, or firmware incorporated in a computer readable medium for execution by a computer or processor. Examples of non-transitory computer-readable storage media include, but are not limited to, a read only memory (ROM), random access memory (RAM), a register, cache memory, semiconductor memory devices, magnetic media such as internal hard disks and removable disks, magneto-optical media, and optical media such as CD-ROM disks, and digital versatile disks (DVDs). A processor in association with software may be used to implement a radio frequency transceiver for use in a WTRU 102, UE, terminal, base station, RNC, or any host computer.

[0235] Moreover, in the embodiments described above, processing platforms, computing systems, controllers, and other devices containing processors are noted. These devices may contain at least one Central Processing Unit ("CPU") and memory. In accordance with the practices of persons skilled in the art of computer programming, reference to acts and symbolic representations of operations or instructions may be performed by the various CPUs and memories. Such acts and operations or instructions may be referred to as being "executed," "computer executed" or "CPU executed."
[0236] One of ordinary skill in the art will appreciate that the acts and symbolically represented operations or instructions include the manipulation of electrical signals by the CPU. An electrical system represents data bits that can cause a resulting transformation or reduction of the electrical signals and the maintenance of data bits at memory locations in a memory system to thereby reconfigure or otherwise alter the CPU’s operation, as well as other processing of signals. The memory locations where data bits are maintained are physical locations that have particular electrical, magnetic, optical, or organic properties corresponding to or representative of the data bits. It should be understood that the exemplary embodiments are not limited to the above-mentioned platforms or CPUs and that other platforms and CPUs may support the provided methods.

[0237] The data bits may also be maintained on a computer readable medium including magnetic disks, optical disks, and any other volatile (e.g., Random Access Memory (“RAM”)) or non-volatile (e.g., Read-Only Memory (“ROM”)) mass storage system readable by the CPU. The computer readable medium may include cooperating or interconnected computer readable medium, which exist exclusively on the processing system or are distributed among multiple interconnected processing systems that may be local or remote to the processing system. It is understood that the representative embodiments are not limited to the above-mentioned memories and that other platforms and memories may support the described methods.

[0238] In an illustrative embodiment, any of the operations, processes, etc. described herein may be implemented as computer-readable instructions stored on a computer-readable medium. The computer-readable instructions may be executed by a processor of a mobile unit, a network element, and/or any other computing device.

[0239] There is little distinction left between hardware and software implementations of aspects of systems. The use of hardware or software is generally (but not always, in that in certain contexts the choice between hardware and software may become significant) a design choice representing cost vs. efficiency tradeoffs. There may be various vehicles by which processes and/or systems and/or other technologies described herein may be effected (e.g., hardware, software, and/or firmware), and the preferred vehicle may vary with the context in which the processes and/or systems and/or other technologies are deployed. For example, if an implementer determines that speed and accuracy are paramount, the implementer may opt for a mainly hardware and/or firmware vehicle. If flexibility is paramount, the implementer may opt for a mainly software implementation. Alternatively, the implementer may opt for some combination of hardware, software, and/or firmware.

[0240] The foregoing detailed description has set forth various embodiments of the devices and/or processes via the use of block diagrams, flowcharts, and/or examples. Insofar as such block diagrams, flowcharts, and/or examples contain one or more functions and/or operations, it will be understood by those within the art that each function and/or operation within such block diagrams, flowcharts, or examples may be implemented, individually and/or collectively, by a wide range of hardware, software, firmware, or virtually any combination thereof. Suitable processors include, by way of example, a general purpose processor, a special purpose processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a
microcontroller, Application Specific Integrated Circuits (ASICs), Application Specific Standard Products (ASSPs); Field Programmable Gate Arrays (FPGAs) circuits, any other type of integrated circuit (IC), and/or a state machine.

[0241] Although features and elements are provided above in particular combinations, one of ordinary skill in the art will appreciate that each feature or element can be used alone or in any combination with the other features and elements. The present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and variations may be made without departing from its spirit and scope, as will be apparent to those skilled in the art. No element, act, or instruction used in the description of the present application should be construed as critical or essential to the invention unless explicitly provided as such. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, will be apparent to those skilled in the art from the foregoing descriptions. Such modifications and variations are intended to fall within the scope of the appended claims. The present disclosure is to be limited only by the terms of the appended claims, along with the full scope of equivalents to which such claims are entitled. It is to be understood that this disclosure is not limited to particular methods or systems.

[0242] It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting. As used herein, when referred to herein, the terms “station” and its abbreviation “STA”, “user equipment” and its abbreviation “UE” may mean (i) a wireless transmit and/or receive unit (WTRU), such as described infra; (ii) any of a number of embodiments of a WTRU, such as described infra; (iii) a wireless-capable and/or wired-capable (e.g., tetherable) device configured with, inter alia, some or all structures and functionality of a WTRU, such as described infra; (iii) a wireless-capable and/or wired-capable device configured with less than all structures and functionality of a WTRU, such as described infra; or (iv) the like. Details of an example WTRU, which may be representative of any UE recited herein, are provided below with respect to FIGS. 1-5.

[0243] In certain representative embodiments, several portions of the subject matter described herein may be implemented via Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs), digital signal processors (DSPs), and/or other integrated formats. However, those skilled in the art will recognize that some aspects of the embodiments disclosed herein, in whole or in part, may be equivalently implemented in integrated circuits, as one or more computer programs running on one or more computers (e.g., as one or more programs running on one or more computer systems), as one or more programs running on one or more processors (e.g., as one or more programs running on one or more microprocessors), as firmware, or as virtually any combination thereof, and that designing the circuitry and/or writing the code for the software and or firmware would be well within the skill of one of skill in the art in light of this disclosure. In addition, those skilled in the art will appreciate that the mechanisms of the subject matter described herein may be distributed as a program product in a variety of forms, and that an illustrative embodiment of the subject matter described herein applies regardless of the particular type of signal bearing medium used to actually carry out the distribution. Examples of a signal bearing medium include, but are not limited to, the following: a recordable type medium such as a floppy disk, a hard disk
drive, a CD, a DVD, a digital tape, a computer memory, etc., and a transmission type medium such as a
digital and/or an analog communication medium (e.g., a fiber optic cable, a waveguide, a wired
communications link, a wireless communication link, etc.).

[0244] The herein described subject matter sometimes illustrates different components contained within,
or connected with, different other components. It is to be understood that such depicted architectures are
merely examples, and that in fact many other architectures may be implemented which achieve the same
functionality. In a conceptual sense, any arrangement of components to achieve the same functionality is
effectively "associated" such that the desired functionality may be achieved. Hence, any two components
herein combined to achieve a particular functionality may be seen as "associated with" each other such that
the desired functionality is achieved, irrespective of architectures or intermediate components. Likewise,
any two components so associated may also be viewed as being "operably connected", or "operably
coupled", to each other to achieve the desired functionality, and any two components capable of being so
associated may also be viewed as being "operably couplable" to each other to achieve the desired
functionality. Specific examples of operably couplable include but are not limited to physically mateable
and/or physically interacting components and/or wirelessly interactable and/or wirelessly interacting
components and/or logically interacting and/or logically interactable components.

[0245] With respect to the use of substantially any plural and/or singular terms herein, those having skill
in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate
to the context and/or application. The various singular/plural permutations may be expressly set forth
herein for sake of clarity.

[0246] It will be understood by those within the art that, in general, terms used herein, and especially in
the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the
term "including" should be interpreted as "including but not limited to," the term "having" should be
interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited
to," etc.). It will be further understood by those within the art that if a specific number of an introduced
claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such
recitation no such intent is present. For example, where only one item is intended, the term "single" or
similar language may be used. As an aid to understanding, the following appended claims and/or the
descriptions herein may contain usage of the introductory phrases "at least one" and "one or more" to
introduce claim recitations. However, the use of such phrases should not be construed to imply that the
introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing
such introduced claim recitation to embodiments containing only one such recitation, even when the same
claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a"
or "an" (e.g., "a" and/or "an" should be interpreted to mean "at least one" or "one or more"). The same
holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific
number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that
such recitation should be interpreted to mean at least the recited number (e.g., the bare recitation of "two
recitations," without other modifiers, means at least two recitations, or two or more recitations).
Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to "at least one of A, B, or C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase "A or B" will be understood to include the possibilities of "A" or "B" or "A and B." Further, the terms "any of" followed by a listing of a plurality of items and/or a plurality of categories of items, as used herein, are intended to include "any of," "any combination of," "any multiple of," and/or "any combination of multiples of" the items and/or the categories of items, individually or in conjunction with other items and/or other categories of items. Moreover, as used herein, the term "set" or "group" is intended to include any number of items, including zero. Additionally, as used herein, the term "number" is intended to include any number, including zero.

[0247] In addition, where features or aspects of the disclosure are described in terms of Markush groups, those skilled in the art will recognize that the disclosure is also thereby described in terms of any individual member or subgroup of members of the Markush group.

[0248] As will be understood by one skilled in the art, for any and all purposes, such as in terms of providing a written description, all ranges disclosed herein also encompass any and all possible subranges and combinations of subranges thereof. Any listed range can be easily recognized as sufficiently describing and enabling the same range being broken down into at least equal halves, thirds, quarters, fifths, tenths, etc. As a non-limiting example, each range discussed herein may be readily broken down into a lower third, middle third and upper third, etc. As will also be understood by one skilled in the art all language such as "up to," "at least," "greater than," "less than," and the like includes the number recited and refers to ranges which can be subsequently broken down into subranges as discussed above. Finally, as will be understood by one skilled in the art, a range includes each individual member. Thus, for example, a group having 1-3 cells refers to groups having 1, 2, or 3 cells. Similarly, a group having 1-5 cells refers to groups having 1, 2, 3, 4, or 5 cells, and so forth.

[0249] Moreover, the claims should not be read as limited to the provided order or elements unless stated to that effect. In addition, use of the terms "means for" in any claim is intended to invoke 35 U.S.C. §112, ¶6 or means-plus-function claim format, and any claim without the terms "means for" is not so intended.

[0250] A processor in association with software may be used to implement a radio frequency transceiver for use in a wireless transmit receive unit (WTRU), user equipment (UE), terminal, base station, Mobility Management Entity (MME) or Evolved Packet Core (EPC), or any host computer. The WTRU may be
used in conjunction with modules, implemented in hardware and/or software including a Software Defined Radio (SDR), and other components such as a camera, a video camera module, a videophone, a speakerphone, a vibration device, a speaker, a microphone, a television transceiver, a hands free headset, a keyboard, a Bluetooth® module, a frequency modulated (FM) radio unit, a Near Field Communication (NFC) Module, a liquid crystal display (LCD) display unit, an organic light-emitting diode (OLED) display unit, a digital music player, a media player, a video game player module, an Internet browser, and/or any Wireless Local Area Network (WLAN) or Ultra Wide Band (UWB) module.

[0251] Although the invention has been described in terms of communication systems, it is contemplated that the systems may be implemented in software on microprocessors/general purpose computers (not shown). In certain embodiments, one or more of the functions of the various components may be implemented in software that controls a general-purpose computer.

In addition, although the invention is illustrated and described herein with reference to specific embodiments, the invention is not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the invention.
What is claimed is:

1. A method of selecting one or more game streams, the method comprising:
   determining, by a processor, one or more in-game contextually relevant metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest; and selecting, by the processor, the one or more game streams relevant to the game stream of interest or the game user based on the in-game contextually relevant metrics.

2. The method of claim 1, further comprising:
   collecting, via a plurality of game devices, a plurality of game streams; and
   storing, in a storage device, the plurality of game streams.

3. The method of claim 1, further comprising sending, to a game device, one of: (1) the selected one or more game streams or (2) one or more identifiers for identifying the selected one or more game streams.

4. The method of claim 1, further comprising receiving, prior to the determining, from a game device, a message requesting selection of the one or more game streams.

5. The method of claim 1, wherein the game device is a game server or an end user device.

6. The method of claim 1, wherein the determining of the one or more in-game contextually relevant metrics includes determining metrics indicative of any of: (1) in-game challenges; (2) in-game situations; or (3) in-game performance.

7. The method of claim 1, wherein the selecting of the one or more game streams includes:
   determining a set of the game streams relevant to an in-game challenge or an in-game situation associated with the game stream of interest; and
   selecting the one or more game streams from the determined set of game streams based on one or more in-game performance metrics associated with the game stream of interest.

8. The method of claim 1, wherein the selecting of the one or more game streams includes:
   for a set of the game streams:
   comparing any of: an in-game challenge, an in-game situation or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams; and
   automatically selecting the one or more game streams based on the comparison.

9. The method of claim 1, wherein the selecting of the one or more game streams includes:
   for a set of game streams:
   comparing any of: an in-game challenge, an in-game situation or an in-game performance metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game situation or corresponding in-game performance metric of a respective game stream of the set of game streams to determine relevancy of the respective game stream; and
   sending, to the game device, an indication of the determined relevancy.

10. The method of claim 1, further comprising:
for a respective game stream of the one or more game streams:

demarcating the respective game stream with indicators that indicate a contextually relevant context of the respective game stream;

indexing the respective game stream at timepoints associated with the demarcated indicators; and

establishing a rank of the respective game stream based on the contextually relevant context associated with the demarcated indicators.

11. The method of claim 10, further comprising:

storing any of: (1) the indicators; (2) the timepoints; or (3) the rank of the respective game stream, as metadata associated with the respective game stream.

12. The method of claim 11, further comprising:

sending, to a game device, the metadata associated with the one or more game streams.

13. The method of claim 1, further comprising:

determining synchronization information to synchronize one or more portions of the selected game stream with the game stream of interest; and

sending, to a game device, the synchronization information for presentation of the selected game stream with the game stream synchronized to the game stream of interest.

14. The method of claim 1, further comprising:

receiving any of: game behavior information or game skill information associated with one or more game users;

selecting at least one game stream of the one or more game users based on the received game behavior information or the received game skills information;

retrieving the selected at least one game stream; and

sending, to a game device, the selected at least one game stream.

15. The method of claim 14, further comprising:

receiving a profile associated with an in-game performance of the game user; and

determining other game users or game streams that at least partially match the received profile.

16. The method of claim 15, further comprising sending, to a game device, any of: (1) information associated with the determined other game users or game streams that at least partial match the received profile; or (2) one or more game streams that at least partial match the received profile.

17. A method of processing one or more game streams, the method comprising:

sending, from a game device, game streams and metadata associated with the game streams; and

sending, from the game device, in-game information associated with a game stream of interest;

receiving, by the game device, selected game streams and contextually relevant in-game metadata;

and

sending, by the game device to a user device, the selected game streams and contextually relevant in-game metadata for presentation by the user device of the selected game streams.

18. A game server for selecting one or more collected game streams, comprising:
a processor configured to:

- determine one or more in-game contextually relevant metrics associated with any of: (1) a
game stream of interest or (2) a game user of the game stream of interest; and
- select the one or more game streams relevant to the game stream of interest or the game
user of the game stream of interest based on the in-game contextually relevant metrics.

19. The game server of claim 18, further comprising:

- a transmit/receive unit configured to receive, via a plurality of game devices, a plurality of game
streams; and
- a storage unit configured to store the plurality of game streams.

20. The game server of claim 18, further comprising a transmit/receive unit configured to send to a
game device one of: (1) the selected one or more game streams or (2) one or more identifiers for identifying
the selected one or more game streams.

21. The game server of claim 18, further comprising a transmit/receive unit configured to receive, from
a game device, a message requesting selection of the one or more game streams, wherein the game device
is another game server or an end user device.

22. The game server of claim 18, wherein the processor is configured to determine the in-game
contextually relevant metrics that are indicative of any of: (1) in-game challenges; (2) in-game situations;
or (3) in-game performance.

23. The game server of claim 18, wherein the processor is configured to:

- determine a set of the game streams relevant to an in-game challenge or an in-game situation
associated with the game stream of interest; and
- select the one or more game streams from the determined set of game streams based on one or
more in-game performance metrics associated with the game stream of interest.

24. The game server of claim 18, wherein the processor is configured to:

- for a set of the game streams:
  - compare any of: an in-game challenge, an in-game situation or an in-game performance
metric of the game stream of interest to any corresponding in-game challenge, corresponding in-game
situation or corresponding in-game performance metric of a respective game stream of the set of game
streams; and
  - automatically select the one or more game streams based on the comparison.

25. The game server of claim 18, wherein:

- the processor is configured to:
  - for a set of game streams:
    - comparing any of: an in-game challenge, an in-game situation and/or an in-game
performance metric of the game stream of interest to any corresponding in-game challenge, corresponding
in-game situation or corresponding in-game performance metric of a respective game stream of the set of
game streams to determine relevancy of the respective game stream,
the game server further comprises a transmit/receive unit configured to send to the game device an indication of the determined relevancy.

26. The game server of claim 18, wherein the processor is configured to:

for a respective game stream of the one or more game streams:

demarcate the respective game stream with indicators that indicate a contextually relevant context of the respective game stream;

index the respective game stream at timepoints associated with the demarcated indicators;

and

establish a rank of the respective game stream based on the contextually relevant context associated with the demarcated indicators.

27. The game server of claim 26, further comprising:

a storage unit configured to store any of: (1) the indicators; (2) the timepoints; or (3) the rank of the respective game stream, as metadata associated with the respective game stream.

28. The game server of claim 27, further comprising a transmit/receive unit configured to send to a game device the metadata associated with the one or more game streams.

29. The game server of claim 18, wherein:

the processor is configured to:

determine synchronization information to synchronize one or more portions of the selected game stream with the game stream of interest; and

the game server further comprises a transmit/receive unit configured to send to a game device the synchronization information for presentation of the selected game stream with the game stream synchronized to the game stream of interest.

30. The game server of claim 18, further comprising a transmit/receive unit configured to receive any of: game behavior information or game skill information associated with one or more game users, wherein:

the processor is configured to:

select at least one game stream of the one or more game users based on the received game behavior information or the received game skills information, and

retrieve the selected at least one game stream; and

the transmit/receive unit is configured to send to a game device the at least one game stream retrieved by the processor.

31. The game server of claim 18, further comprising a transmit/receive unit configured to receive a profile associated with in-game performance of the game user, wherein the processor is configured to determine other game users or game streams that at least partially match the received profile.

32. The game server of claim 18, further comprising a transmit/receive unit configured to send to a game device any of: (1) information associated with the determined other users or game streams that at least partial match the received profile; or (2) one or more game streams that at least partial match the received profile.
Compact visual notation to show the live gameplay events of all watched streams; this format can appear in multiple resolutions of detail, and on any platform, containing down to just a few panels. Click to jump to watching the streams, sort them by relevance or stream.
Compact matrix display of 99 gaming streams; each tile updates at some interval; mouse hover and click enlarges and drills down for more detail.
Gameplay windows morph continuously (e.g., shrink proportionately), responsively, and flexibly so that user gaze need NOT leave the game G while P loads and plays.
User accepts watching suggested reference gameplay and opts to cast it to a separate computer screen to maintain focus and responsiveness with present gameplay.

Reference gameplay is "cast" onto another computer.
**FIG. 16**

1600

Determine, by a processor, one or more in-game metrics associated with any of: (1) a game stream of interest or (2) a game user of the game stream of interest.

1610

1620

Select, by the processor, the one or more game streams of interest based on the in-game metrics contextually relevant to the game stream of interest.

**FIG. 17**

1700

Obtain, via a gaming server, game streams that are contextually relevant to a game stream of interest associated with the contextually relevant game stream.

1710

1720

Present a dashboard of the contextually relevant game streams and in-game information as a plurality of ribbons.
FIG. 18

1800

OBTAIN VIA A GAMING SERVER, AN ASSISTANCE GAME STREAM THAT IS CONTEXTUALLY RELEVANT TO A GAME PERFORMANCE ASSOCIATED WITH THE ASSISTANCE GAME STREAM.

1810

PRESENT ON A DISPLAY A PORTION OF THE ASSISTANCE GAME STREAM BASED ON THE IN-GAME PERFORMANCE INFORMATION.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A63F13/86 H04N21/00 H04N21/478
ADD.

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)

G06Q A63F H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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Further documents are listed in the continuation of Box C. See patent family annex.

"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

"A" document member of the same patent family

Date of the actual completion of the international search

16 November 2016

Date of mailing of the international search report

23/11/2016

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-3040,
Fax: (+31-70) 340-3016

Authorized officer

With, Francis

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