CLAIMS

1. A computer-implemented method, comprising:

transmitting, to at least one server and/or decentralized infrastructure and from a first electronic communication device, information about the first electronic communication device, wherein the information about the first electronic communication device comprises vicinity information about a vicinity of the first electronic communication device;

receiving and storing contact proximity network information about a contact proximity network from the at least one server and/or decentralized infrastructure, wherein the contact proximity network is based, in part, on the information from a plurality of electronic communication devices and information about the association between users and electronic communication devices, wherein the contact proximity network information comprises status signal information associated with users within the contact proximity network, and wherein the contact proximity network comprises a plurality of interconnected nodes, wherein each node of the plurality of interconnected nodes corresponds to a different user and each pairwise connection between two users in the contact proximity network is based in part upon their current or past relative physical space and time proximity; and

providing, using the contact proximity network information received from the at least one server and/or decentralized infrastructure, a user notification indicating a network-based proximity of a first user in the contact proximity network to a second user in the contact proximity network, wherein the second user is identified as associated with a specified status signal within a specified time frame,

wherein the network-based proximity of the first user to the second user is a minimum number of connections between the first user and the second user along the contact proximity network during the specified time frame.

2. The computer-implemented method of claim 1, wherein the vicinity information for the first electronic communication device includes information about a second electronic communication device, wherein the information about the second electronic communication device comprises data regarding a proximity or location of the first electronic communication device relative to the second electronic communication device, and wherein the method further comprises transmitting the information about the second electronic communication device to the at least one server and/or decentralized infrastructure.

3. The computer-implemented method of claim 1, wherein the specified status signal is positivity for a contagion.

4. The computer-implemented method of claim 1, wherein the status signal is being a physical contact of a person who is positive for a contagion, or more generally, being less than or equal to a specified number of physical contacts separated from a person who is positive for a contagion.

5. The computer-implemented method of claim 1, wherein the user notification is one or more of a text, an animation, and a graphical display.

6. The computer-implemented method of claim 5, wherein the graphical display comprises information about a dynamically updatable contact proximity network, and wherein that information includes bars graphically summarizing connections among nodes in the contact proximity network.

7. The computer-implemented method of claim 2, wherein obtaining information about the second electronic communication device comprises estimating a physical distance between the first electronic communication device and the second electronic communication device based on one or more of an audio signal, a radio-frequency signal, an infrared signal, and an optical signal emitted by one or more of the first electronic communication device and by the second electronic

communication device; and/or by signals between the first and second electronic communication devices and other electronic communication device(s) which are used to estimate the distance between the first and second electronic communication devices.

8. The computer-implemented method of claim 5, wherein the contact proximity network illustrates a time-evolution of contact network distance(s) from the first user to other users reporting status signals during time windows of interest.

9. The computer-implemented method of claim 1, wherein the vicinity information includes information about a second electronic communication device that comprises one or more of:

a physical distance of the second electronic communication device from the first electronic communication device; and

data about audio, radio-frequency, optical, and/or infrared signals emitted by one or both of the second electronic communication device and the first electronic communication device.

10. The computer-implemented method of claim 1, wherein the contact proximity network traces a spread through the contact proximity network, of users reporting a specified status signal.

11. The computer-implemented method of claim 10,

wherein the contact proximity network represents pairwise interactions between users,

wherein the contact proximity network comprises proximity information amongst a plurality of users associated with a plurality of electronic communication devices, wherein the proximity information comprises a geographical distance, a network distance along the contact proximity network, and/or frequency of contact between users' associated electronic communication devices,

and wherein the proximity information comprises one or more of:

current geographical distance between users' associated electronic communication devices, and/or a current network distance between users;

past geographical distance between users' associated electronic communication devices, and/or a network distance between users during a past period of time;

time information related to when users' associated electronic communication devices were within a defined vicinity relative to one another;

and/or duration information related to how long users' associated electronic communication devices were within the defined vicinity relative to one another.

12. The computer-implemented method of claim 1, further comprising deriving a predicted spread of users reporting a specified status signal along at least part of the contact proximity network.

13. The computer-implemented method of claim 1, further comprising outputting a time-evolution graphic depicting a spread of users reporting a specified status signal along at least part of the contact proximity network, wherein the time-evolution graphic comprises a representation of a number of users reporting a specified status signal within a specified time window as a function of network distance along the contact proximity network.

14. The computer-implemented method of claim 1, further comprising identifying and/or outputting a post-exposure notification to users exposed to a user reporting a specified status signal within a specified time frame.

15. The computer-implemented method of claim 1, further comprising determining a duration over which the first electronic communication device is within a predefined vicinity of a second electronic communication device.

16. The computer-implemented method of claim 1, further comprising transmitting, to at least one server, information about at least one user, wherein the information includes an indicator to report specified status signal(s) on behalf of and associated with the at least one user.

17. The computer-implemented method of claim 1, further comprising transmitting, by a third electronic communication device, an indicator that at least one user of the contact proximity network reports specified status signal(s).

18. The computer-implemented method of claim 17, further comprising assigning a trusted authentication rating to the indicator received from the third electronic communication device.

19. The computer-implemented method of claim 1, further comprising outputting an exposure notification indicative of a first user's contact proximity to a second user reporting a specified status signal, wherein the contact proximity to the second user comprises a geographical distance and/or a network distance along the contact proximity network between the two users.

20. A computer-implemented system, comprising

one or more electronic processors,

one or more computer memory devices interoperably coupled with the one or more electronic processors and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more electronic processors, perform one or more operations comprising:

transmitting, to at least one server and/or decentralized infrastructure and from a first electronic communication device, information about the first electronic communication device, wherein the information about the first electronic communication device comprises vicinity information about a vicinity of the first electronic communication device;

receiving and storing contact proximity network information about a contact proximity network from the at least one server and/or decentralized infrastructure, wherein the contact proximity network is based, in part, on the information from a plurality of electronic communication devices and information about the association between users and electronic communication devices, wherein the contact proximity network information comprises status signal information associated with users within the contact proximity network, and wherein the contact proximity network comprises a plurality of interconnected nodes, wherein each node of the plurality of interconnected nodes corresponds to a different user and each pairwise connection between two users in the contact proximity network is based in part upon their current or past relative physical space and time proximity; and

providing, using the contact proximity network information received from the at least one server and/or decentralized infrastructure, a user notification indicating a network-based proximity of a first user in the contact proximity network to a second user in the contact proximity network, wherein the second user is identified as associated with a specified status signal within a specified time frame,

wherein the network-based proximity of the first user to the second user is a minimum number of connections between the first user and the second user along the contact proximity network during the specified time frame.

21. The computer-implemented system of claim 20, wherein the vicinity information for the first electronic communication device includes information about a second electronic communication device, wherein the information about the second electronic communication device comprises data regarding a proximity or location of the first electronic communication device relative to the second electronic communication device, and wherein the operations further comprise transmitting the information about the second electronic communication device to the at least one server and/or decentralized infrastructure.

22. The computer-implemented system of claim 20, wherein the specified status signal is positivity for a contagion.

23. The computer-implemented system of claim 20, wherein the status signal is being a physical contact of a person who is positive for a contagion, or more generally, being less than or equal to a specified number of physical contacts separated from a person who is positive for a contagion.

24. The computer-implemented system of claim 20, wherein the user notification is one or more of a text, an animation, and a graphical display.

25. The computer-implemented system of claim 24, wherein the graphical display comprises information about a dynamically updatable contact proximity network, and wherein that information includes bars graphically summarizing connections among nodes in the contact proximity network.

26. The computer-implemented system of claim 21, wherein obtaining information about the second electronic communication device comprises estimating a physical distance between the first electronic communication device and the second electronic communication device based on one or more of an audio signal, a radio-frequency signal, an infrared signal, and an optical signal emitted by one or more of the first electronic communication device and by the second electronic communication device, and/or by signals between the first and second electronic communication devices and other electronic communication device(s) which are used to estimate the distance between the first and second electronic communication devices.

27. The computer-implemented system of claim 24, wherein the contact proximity network illustrates a time-evolution of contact network distance(s) from the first user to other users reporting status signals during time windows of interest.

28. The computer-implemented system of claim 20, wherein the vicinity information includes information about a second electronic communication device that comprises one or more of:

a physical distance of the second electronic communication device from the first electronic communication device; and

data about audio, radio-frequency, optical, and/or infrared signals emitted by one or both of the second electronic communication device and the first electronic communication device.

29. The computer-implemented system of claim 20, wherein the contact proximity network traces a spread through the contact proximity network, of users reporting a specified status signal.

30. The computer-implemented system of claim 29,

wherein the contact proximity network represents pairwise interactions between users,

wherein the contact proximity network comprises proximity information amongst a plurality of users associated with a plurality of electronic communication devices, wherein the proximity information comprises a geographical distance, a network distance along the contact proximity network, and/or frequency of contact between users' associated electronic communication devices,

and wherein the proximity information comprises one or more of:

current geographical distance between users' associated electronic communication devices, and/or a current network distance between users;

past geographical distance between users' associated electronic communication devices, and/or a network distance between users during a past period of time;

time information related to when users' associated electronic communication devices were within a defined vicinity relative to one another;

and/or duration information related to how long users' associated electronic communication devices were within the defined vicinity relative to one another.

31. The computer-implemented system of claim 20, the operations further comprising deriving a predicted spread of users reporting a specified status signal along at least part of the contact proximity network.

32. The computer-implemented system of claim 20, the operations further comprising outputting a time-evolution graphic depicting a spread of users reporting a specified status signal along at least part of the contact proximity network, wherein the time-evolution graphic comprises a representation of a number of users reporting a specified status signal within a specified time window as a function of network distance along the contact proximity network.

33. The computer-implemented system of claim 20, the operations further comprising identifying and/or outputting a post-exposure notification to users exposed to a user reporting a specified status signal within a specified time frame.

34. The computer-implemented system of claim 20, the operations further comprising determining a duration over which the first electronic communication device is within a predefined vicinity of a second electronic communication device.

35. The computer-implemented system of claim 20, the operations further comprising transmitting, to at least one server, information about at least one user, wherein the information includes an indicator to report specified status signal(s) on behalf of and associated with the at least one user.

36. The computer-implemented system of claim 20, the operations further comprising transmitting, by a third electronic communication device, an indicator that at least one user of the contact proximity network reports specified status signal(s).

37. The computer-implemented system of claim 36, the operations further comprising assigning a trusted authentication rating to the indicator received from the third electronic communication device.

38. The computer-implemented system of claim 20, the operations further comprising outputting an exposure notification indicative of a first user's contact proximity to a second user reporting a specified status signal, wherein the contact proximity to the second user comprises a geographical distance and/or a network distance along the contact proximity network between the two users.

39. A computer-implemented method, comprising:

obtaining, by at least one server and/or decentralized infrastructure and from a first electronic communication device, information about the first electronic communication device, wherein the information about the first electronic communication device comprises vicinity information about a vicinity of the first electronic communication device;

generating and/or updating, and storing, by the at least one server and/or decentralized infrastructure, a contact proximity network based, in part, on the information from the first electronic communication device (which may include information about a second electronic

communication device), and optionally the status signal associated with a first user, wherein the contact proximity network comprises a plurality of interconnected nodes, wherein each node of the plurality of interconnected nodes corresponds to a different user and each pairwise connection between two users in the contact proximity network is based in part upon their current or past relative physical space and time proximity; and

providing, by the at least one server and/or decentralized infrastructure and to the first electronic communication device, contact proximity network information about the contact proximity network, wherein the contact proximity network information comprises status signal information associated with users within the contact proximity network, and

wherein the contact proximity information comprises a user notification indicating a network-based proximity of the first user in the contact proximity network to a second user in the contact proximity network, wherein the second user is identified as associated with a specified status signal within a specified time frame, and

wherein the network-based proximity of the first user to the second user is a minimum number of connections between the first user and the second user along the contact proximity network during the specified time frame.

40. The computer-implemented method of claim 39, wherein the vicinity information about the vicinity of the first electronic communication device comprises location information of the first electronic communication device.

41. The computer-implemented method of claim 39, wherein the vicinity information about the vicinity of the first electronic communication device comprises data about an environment in which the first electronic communication device is located.

42. The computer-implemented method of claim 39, wherein the vicinity information about the vicinity of the first electronic communication device comprises information about a second electronic communication device.

43. The computer-implemented method of claim 42, wherein the information about the second electronic communication device comprises a physical distance of the first electronic communication device to the second electronic communication device.

44. The computer-implemented method of claim 42, wherein the information about the second electronic communication device comprises information about a wireless local area network, about a wireless access point, or about an electronic communication device in the vicinity of the first electronic communication device.

45. The computer-implemented method of claim 39, wherein obtaining the status signal associated with a first user of the first electronic communication device comprises receiving the status signal from the first electronic communication device or receiving the status signal from a third electronic communication device.

46. The computer-implemented method of claim 39, wherein obtaining the status signal associated with a first user of the first electronic communication device comprises receiving a trusted authentication token, wherein the trusted authentication token authenticates the status signal associated with the first user.

47. The computer-implemented method of claim 39, wherein generating and storing the contact proximity network comprises determining a duration over which the first electronic communication device is within a predefined vicinity of the second electronic communication device.

48. The computer-implemented method of claim 39, wherein the user notification is one or more of a text, an animation, and a graphical display.

49. The computer-implemented method of claim 39, wherein the user notification is a graphical display that comprises a dynamically updatable chart comprising bars graphically summarizing the network-based proximity of the first user in the contact proximity network to at least one other user identified as associated with the specified status signal within the specified time frame.

50. The computer-implemented method of claim 39, wherein the contact proximity network represents pairwise proximal interactions between users,

wherein the contact proximity network comprises proximity information amongst a plurality of users associated with a plurality of electronic communication devices, wherein the proximity information comprises a geographical distance, a network distance along the contact proximity network, and/or frequency of contact between users' associated electronic communication devices,

and wherein the proximity information comprises one or more of:

current geographical distance between users' associated electronic communication devices, and/or a current network distance between users;

past geographical distance between users' associated electronic communication devices, and/or a network distance between users during a past period of time;

time information related to when users' associated electronic communication devices were within a defined vicinity relative to one another;

and/or duration information related to how long users' associated electronic communication devices were within the defined vicinity relative to one another.

51. The computer-implemented method of claim 39, wherein the user notification comprises a predicted spread of users reporting a specified status signal along at least part of the contact proximity network.

52. The computer-implemented method of claim 39, comprising outputting a time-evolution graphic depicting a spread of users reporting a specified status signal along at least part of the contact proximity network, wherein the time-evolution graphic comprises a representation of a number of users reporting the specified status signal within a specified time frame as a function of network distance along the contact proximity network.

53. The computer-implemented method of claim 39, comprising identifying and/or outputting a post-exposure notification to users exposed to a user reporting a specified status signal within a specified time frame.

54. A computer-implemented system, comprising

one or more electronic processors,

one or more computer memory devices interoperably coupled with the one or more electronic processors and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more electronic processors, perform one or more operations comprising:

obtaining, by at least one server and/or decentralized infrastructure and from a first electronic communication device, information about the first electronic communication device, wherein the information about the first electronic communication device comprises vicinity information about a vicinity of the first electronic communication device;

generating and/or updating, and storing, by the at least one server and/or decentralized infrastructure, a contact proximity network based, in part, on the information from the first electronic communication device (which may include information about a second electronic communication device), and optionally the status signal associated with a first user, wherein the contact proximity network comprises a plurality of interconnected nodes, wherein each node of the plurality of interconnected nodes corresponds to a different user and each pairwise connection between two users in the contact proximity network is based in part upon their current or past relative physical space and time proximity; and

providing, by the at least one server and/or decentralized infrastructure and to the first electronic communication device, contact proximity network information about the contact proximity network, wherein the contact proximity network information comprises status signal information associated with users within the contact proximity network, and

wherein the contact proximity information comprises a user notification indicating a network-based proximity of the first user in the contact proximity network to a second user in the contact proximity network, wherein the second user is identified as associated with a specified status signal within a specified time frame, and

wherein the network-based proximity of the first user to the second user is a minimum number of connections between the first user and the second user along the contact proximity network during the specified time frame.

55. The computer-implemented system of claim 54, wherein the vicinity information about the vicinity of the first electronic communication device comprises location information of the first electronic communication device.

56. The computer-implemented system of claim 54, wherein the vicinity information about the vicinity of the first electronic communication device comprises data about an environment in which the first electronic communication device is located.

57. The computer-implemented system of claim 54, wherein the vicinity information about the vicinity of the first electronic communication device comprises information about a second electronic communication device.

58. The computer-implemented system of claim 57, wherein the information about the second electronic communication device comprises a physical distance of the first electronic communication device to the second electronic communication device.

59. The computer-implemented system of claim 57, wherein the information about the second electronic communication device comprises information about a wireless local area network, about a wireless access point, or about an electronic communication device in the vicinity of the first electronic communication device.

60. The computer-implemented system of claim 54, wherein obtaining the status signal associated with a first user of the first electronic communication device comprises receiving the status signal from the first electronic communication device or receiving the status signal from a third electronic communication device.

61. The computer-implemented system of claim 54, wherein obtaining the status signal associated with a first user of the first electronic communication device comprises receiving a trusted authentication token, wherein the trusted authentication token authenticates the status signal associated with the first user.

62. The computer-implemented system of claim 54, wherein generating and storing the contact proximity network comprises determining a duration over which the first electronic communication device is within a predefined vicinity of the second electronic communication device.

63. The computer-implemented system of claim 54, wherein the user notification is one or more of a text, an animation, and a graphical display.

64. The computer-implemented system of claim 54, wherein the user notification is a graphical display that comprises a dynamically updatable chart comprising bars graphically summarizing the network-based proximity of the first user in the contact proximity network to at least one other user identified as associated with the specified status signal within the specified time frame.

65. The computer-implemented system of claim 54, wherein the contact proximity network represents pairwise proximal interactions between users,

wherein the contact proximity network comprises proximity information amongst a plurality of users associated with a plurality of electronic communication devices, wherein the proximity information comprises a geographical distance, a network distance along the contact proximity network, and/or frequency of contact between users' associated electronic communication devices,

and wherein the proximity information comprises one or more of:

current geographical distance between users' associated electronic communication devices, and/or a current network distance between users;

past geographical distance between users' associated electronic communication devices, and/or a network distance between users during a past period of time;

time information related to when users' associated electronic communication devices were within a defined vicinity relative to one another;

and/or duration information related to how long users' associated electronic communication devices were within the defined vicinity relative to one another.

66. The computer-implemented system of claim 54, wherein the user notification comprises a predicted spread of users reporting a specified status signal along at least part of the contact proximity network.

67. The computer-implemented system of claim 54, the operations comprising outputting a time-evolution graphic depicting a spread of users reporting a specified status signal along at least part of the contact proximity network, wherein the time-evolution graphic comprises a representation of a number of users reporting the specified status signal within a specified time frame as a function of network distance along the contact proximity network.

68. The computer-implemented system of claim 54, the operations comprising identifying and/or outputting a post-exposure notification to users exposed to a user reporting a specified status signal within a specified time frame.