



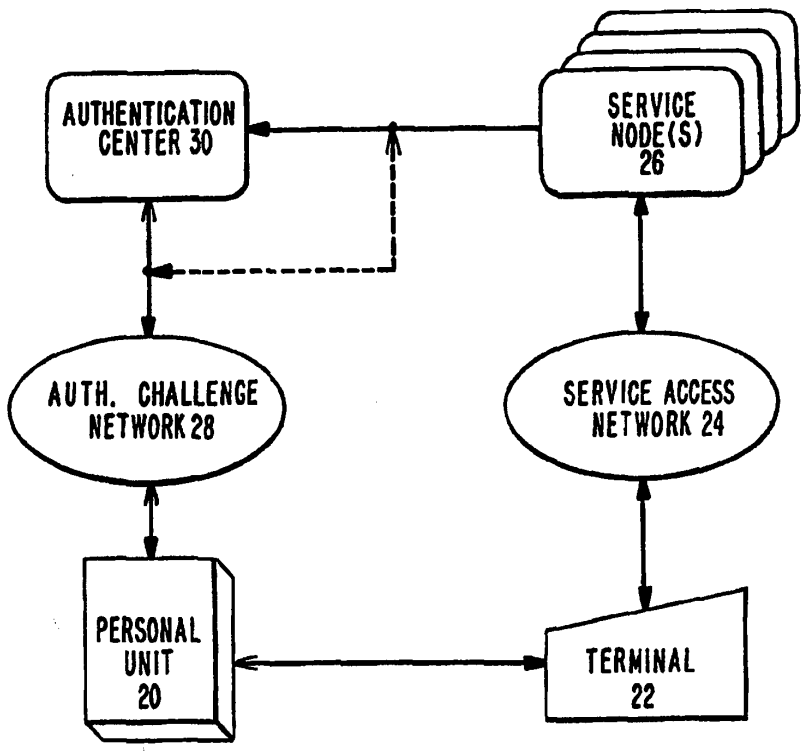
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : H04Q 7/38, G07F 19/00</p>	<p>A2</p>	<p>(11) International Publication Number: WO 96/00485 (43) International Publication Date: 4 January 1996 (04.01.96)</p>
<p>(21) International Application Number: PCT/SE95/00719 (22) International Filing Date: 14 June 1995 (14.06.95) (30) Priority Data: 08/264,939 24 June 1994 (24.06.94) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON [SE/SE]; S-126 25 Stockholm (SE). (72) Inventors: JONSSON, Björn, Erik, Rutger; Dimvägen 36, S-175 38 Järfälla (SE). FALK, Johan, Per; Gustav Trolles Väge 4, S-175 76 Järfälla (SE). (74) Agents: BOHLIN, Björn et al.; Telefonaktiebolaget LM Ericsson, Patent Dept., S-126 25 Stockholm (SE).</p>	<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).</p> <p>Published <i>Without international search report and to be republished upon receipt of that report.</i></p>	

(54) Title: USER AUTHENTICATION METHOD AND APPARATUS

(57) Abstract

Authorization for a user to use a service is provided by a modified pager which calculates a unique response code to a transmitted challenge code based on the challenge code, an input personal identification number, and an internal key. The response code is input to a simple terminal, such as a telephone and if the unique response code is acceptable, the user may access the desired service, such as cashless transactions or long distance phone service.



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USER AUTHENTICATION METHOD AND APPARATUS**BACKGROUND OF THE INVENTION****1) Field of the Invention**

The present invention involves a method and an apparatus
5 for authentication of a user attempting to access an electro-
nic service, and, in particular, providing an authentication
unit which is separate from preexisting systems.

2) Description of Related Art

Effective authentication methods and apparatuses have
10 been in great demand to prevent fraud and theft of services.
This demand increases with the explosion of electronic
services in the current information age. Electronic services
such as banking services, credit card services, automatic
teller machine (ATM) services, account information services
15 such as mortgage, savings and investment accounts, general
information services such as data base services and networks,
security services and long distance phone services all require
that a user be accurately identified for purposes of security,
proper billing and avoidance of fraud. Recently, fraud in the
20 cellular mobile telephone industry has placed so great a
demand on effective authentication methods that a protocol has
been standardized for cellular mobile systems. See, GSM
03.20, European Telecommunications Standards Institute
(ETSI), 1993, pp. 19-29 and U.S. Patent No. 5,282,250, herein
25 incorporated by reference.

However, conventional authentication systems have
required specially equipped terminals with card readers such
as ATMs or credit card gas station terminals, data terminals
using a log-in procedure, or cellular mobile radio stations
30 with built-in authentication capabilities. Credit cards
having a magnetic strip provide only minimal security insomuch
as the bearer of the card is usually permitted to conduct
transactions without further authentication of the user's
identification other than perhaps comparing a unauthenticated

signature on the card to a signature of the user. Even in transactions when signatures are required, the certainty of the user's identification is minimal.

Other identity cards, such as ATM cards, require a log-on procedure with a password, or PIN. But the PIN, once learned by an unauthorized user, offers no security in authenticating the user if the user can duplicate the ATM card.

These methods of authentication require specially equipped, and often dedicated, terminals, which raises the cost and reduces the availability of the associated electronic service. In other words, the prior art security systems often require a dedicated or customized terminal or modification to existing terminals, which greatly restricts the use of security systems to specific sites. Also, a user may use several electronic services, each service requiring an authentication procedure and/or personal identification number (PIN) or password, each procedure or password different from the others. As a subscriber to several electronic services, a user might end up with numerous passwords to remember. Even worse, he or she may be required to change these passwords periodically, thus having to remember if a password is still valid or not.

Also, transactions requiring relatively certain authentication have been largely unavailable from relatively simple terminals like telephones. For instance, home banking by telephone has been limited to transactions involving the bank customer's own accounts or using only the customer's own telephone.

SUMMARY OF THE INVENTION

The present invention overcomes these and other problems by providing an authentication procedure wherein the user carries a personal unit not limited to use with or physically connected to a terminal of any one specific electronic service. The personal unit can be used to authenticate a

user's identity through a variety of terminals associated with a variety of electronic services.

The personal unit includes a receiver for receiving a transmitted challenge code and an algorithm unit which
5 processes the challenge code, a user input such as a personal identification number (PIN) or electronically recognizable signature, and an internally stored security key for calculating a response code according to a pre-stored algorithm. The response code is then sent to the service node and, if it
10 is acceptable, access to the service is authorized.

The basic method involves receiving a challenge code from a system, the user inputting a personal identification number or other recognizable input, and the personal unit generating a response code based on an internally stored algorithm. The
15 PIN or other user input may be changed from time to time, and the challenge code and the response is unique for each transaction. The personal unit may receive and store a plurality of challenge codes for later use.

The personal unit can be used with virtually any existing
20 terminal of an electronic service without requiring the terminal to be modified or customized. For instance, the personal unit can be used with a standard telephone, whether a radio telephone or land-line telephone. The user can input the response code displayed on the personal unit through the
25 telephone keypad or the personal unit can include a DTMF transmitter for direct input of the response code into the microphone of the telephone. It follows that the keypad of any service terminal (e.g., a data terminal connected to a service computer) can be used to input the response code. If
30 some other input device is used in a terminal, such as an acoustic input, an inductively coupled input, an optical input, radio transmitter (particularly if the terminal is by-passed and the response code is transmitted directly to the authentication center), etc., the personal unit can include a
35 compatible output device. In other words, the personal unit can be modified or equipped to be compatible with existing or

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