Call Pattern Analysis of Telemedicine Project Healthline 789

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Abstract: *Health Line 789 is a real time telemedical consulting project, the first of its kind in telemedicine. It is a GSM medical call centre or service point where patients are connected over mobile phone to doctors, who provide emergency services, medication, and drug information. The GSM call centre is equipped with a class IV public switch as Inter exchange carrier, and a PBX. Subscribers can dial 789 from any GP phone in Bangladesh. The call hit rate of HealthLine 789 is indicative of patient response, and generally shows an upward trend during its existence. In the short period of its existence, the call patterns indicate that this project is likely to be sustainable. The call pattern rate and response indicate that medical tele-conferencing over cellular phone has a potentially large market. In spite of some technical shortcomings, the findings indicate that subscribers are well-benefited by the services provided in this paper.*

Key Words: CDR, call pattern, Automatic call distribution, TDM Call center.

1. INTRODUCTION

GrameenPhone and Telemedicine Reference Centre Ltd (TRCL) have jointly started a Mobile communication based on medical teleconferencing project, HealthLine 789. This is a GSM-based medical call centre where patients are treated by doctors over their mobile phones. The Short Message Service is used for transmitting medical, diagnosis, and lab reports to the patient. This paper briefly discusses the incoming call properties, call ratio, per hour patterns, and other issues from TELES.iSWITCH and PBX generated Call Detail Record, CDR [1].

2. CDR FROM TELES AND PBX REPORT

The CDR contains call index, caller number (OID), call duration, and call setup time according to ISUP, port & channel info, connection status and CAU (call summary). These data provide indications for financial, human resources and strategic issues [1] [2]. The Dial 789 project has been successfully operational from November 4, 2006. For testing purposes, the Telecom (Technical) Dept of TRCL analyzed the weekly call record data from Nov 4th to 10th Nov 2006 and generated the following reports [1] [3]:

2.1 TELES.iSWITCH report from CDR:

The numbers of calls as well as the total duration is important for financial reasons, and project planning. The total number of call and time can be generated from the Call Detail Record (CDR).

The first 20 sec was free, for calls to 789. Charging starts after 20 Sec. The calls that try to access the 789 from GP phone are considered as hits, and among them, the call of duration of more than 20 sec are treated as served call. A served call means the call was received by agents [4].

Table 1. Call Congestion Status

SL. NO.	Date	No. of Calls Hit to Call Centre (in the day)	No. of Calls (Duration more than 20s) Served by the Call Centre (in that day)	% of the Calls Served by the Call Centre
1	4-Nov-06	28,766	6,400	22 %
2	5-Nov-06	17,606	5,701	32%
3	6-Nov-06	12,715	4,767	37%
4	7-Nov-06	25,466	5,711	22%
5	8-Nov-06	26,754	6,206	24%
6	9-Nov-06	37,618	6,637	18%
7	10-Nov-06	26,993	7,165	27%
	Total (Period 4th to 10th Nov.)	**163,411**	**42,587**	**26% Avg.**

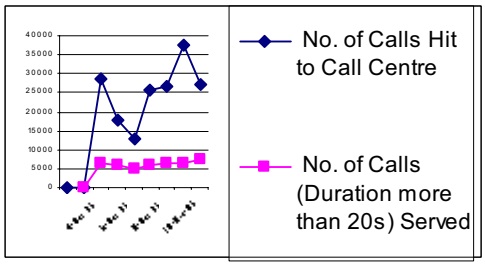

Figure 1. Hits vs. Answered Calls

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Analyzing the above table and graph, it is clear that the answered call ratio in terms of hits in TELES.iSWITCH is very low. This is because in teles switch the inlet capacity is 60 channels and outlet capacity was only 15. This means that the call center capacity was limited. When the calls tried to terminate to the Pbx end, a bottleneck was created, and most calls failed to terminate. It was also observed that the number of hit calls, and the served calls increased proportionally [1][5].

The PBX announcement time and system time were configured such that, in the period of 20 seconds, 16 sec was allocated for announcement and 3 sec or 1 cycle was used by the PBX system. In this 20 sec, users can avail the facility of DTMF.

In the above table, it was found that the average call congestion was 26 percent, meaning that 74 % of calls were not served properly.

Table 2. Call Numbers Generated in 24 hours (source: Primary data).

Time/Date	4th	5th Nov	6th Nov	7th Nov	8th	9th	10th	Avg cal
1 hour	211	118	109	67	212	176	162	151
2 hour	112	45	36	42	0	117	84	62
3 hour	16	23	17	16	17	15	14	17
4 hour	24	10	13	27	12	16	30	19
5 hour	3	2	12	14	26	23	17	14
6 hour	8	50	65	60	46	69	117	59
7 hour	174	145	148	150	186	233	263	186
8 hour	282	295	214	196	280	299	403	281
9 hour	303	318	237	301	338	369	358	318
10 hour	228	290	339	316	292	353	403	317
11 hour	237	293	186	316	331	336	412	302
12 hour	382	277	298	250	335	340	409	327
13 hour	462	295	272	370	361	313	404	354
14 hour	531	377	297	358	328	321	392	372
15 hour	573	372	253	271	366	352	391	368
16 hour	468	308	0	355	313	369	398	316
17 hour	446	280	71	322	319	376	338	307
18 hour	540	362	301	344	369	399	392	387
19 hour	322	339	327	335	344	383	417	352
20 hour	198	351	368	368	392	382	365	346
21 hour	183	336	275	338	337	376	381	318
22 hour	250	359	384	313	347	380	366	343
23 hour	264	300	305	299	315	354	363	314
24 hour	183	354	238	243	249	285	286	263

A call pattern from the CDR was generated during the test trail period. Table 2 represents the number of calls per hour in seven days. A decision was taken by strategic management that to improve call congestion rate, the first 20 seconds will not be free. After 19th Nov to till now the congestion rate was above 75%. [5].

To derive the table:2 ,a call pattern circumstances of HealthLine project was used.

Analyzing the following graph, it was seen that the peak time or busy hour call attempt (BHCA) was 14:00-16:00 and 19:30- 22:00 hours. The call rate remained the same from 14:00 to 23:00 hours. From 01:00 to 08:00 hours, it was very low.

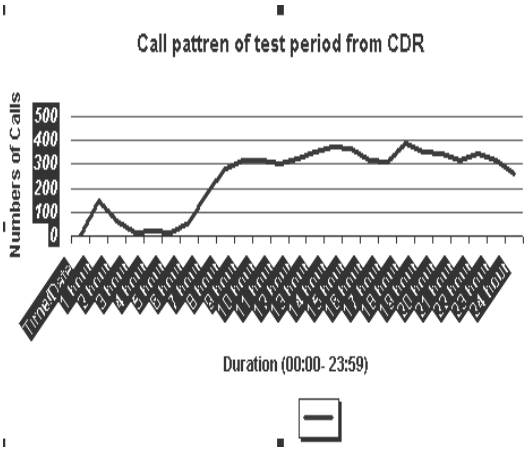

Figure 2. Call Pattern of HealthLine Project

This graph indicates how human resources should be planned for proper utilization. The above pattern could be different depending on natural disaster, political imbalance or any other social issues.

2.2 PBX provided Call pattern:

The following graph shows the average received call from 4th to 10th November. From the graph it was found that the Busy hour was 17:00 to 19:00.

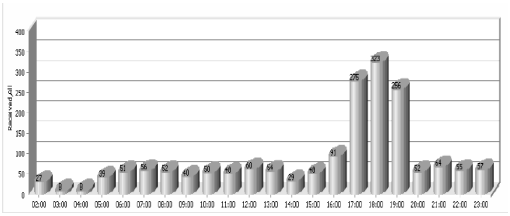

Figure: 3 Received call pattern form PBX report server

From this secondary data, it was also found that the call rate was increasing from 16:00 hours.

2.3 PBX channel congestion:

Only 4 channels (Voice channel) were opened in DSS1 line to check the call congestion. Five GP numbers were used to check the call congestions. Five cell calls were attempted at the same time.

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The following table was extracted from PBX server (ACD). To derive this table it was found that the average answered call number was 47.14%. The total average unanswered time was 81.71% [1] [4] [5] [6].

Table: 3 call congestion data from PBX

	d	Answered		Time	Total Unanswered	
Date	Call	Call	%	Total	Time	%
11/4/2006	2038	1263	60	31:41:26	90:17:56	75
11/5/2006	1029	522	51	19:00:28	100:59:03	84
11/6/2006	1040	433	42	16:54:23	103:05:03	86
11/7/2006	1161	536	46	25:44:54	94:15:06	79
11/8/2006	1167	588	50	21:47:14	98:12:46	82
11/9/2006	1002	484	48	20:27:17	99:32:43	83
11/10/2006	909	297	33	103:54:01	436:05:04	83

2.4 CDR Indications

CDR can indicate different issues about call connection and termination process. One can find CAU values from 'D' Line in CDR. Some effects are described in the following [7].

CAU_NCC means Normal Call Clearing in ISUP protocol. That means the call was connected, set up and terminated properly. It was found that during the 7 days of trial period, 87.67% of call volume value was **CAU_NCC**.

CAU_NUNSP indicates which call is normal but unspecified. It may show call volume but can't trace the channel no. or inlet or outlet port no. It was found that during the test trial 11.09% of call volume call volume was **CAU_NUNSP**.

CAU_SEQC means switching equipment congestion, or call traffic blocking where the calls are torn. Only 1.24 % of total call volume value was found as **CAU_SEQC** [1] [3] [5] [7] [8].

3. CONCLUSION

From the technical findings and the Call patterns of the switch and PBX, it is found that the "dial 789" system works smoothly. The call pattern from TELES.iSWITCH and PBX are similar. The switch can provide the list of HIT data and PBX provides the attended calls. There is also some inconsistency in the pick up time, possibly because Bangladeshi mobile users tend to give missed calls. The upward trend on this service among its users is clearly indicated.

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