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De-Cliticizing Context Dependent Clitics in Pashto Text

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Abstract: The replacement of clitics with strong pronouns (de-cliticization) is an important task in the translation of Pashto into other languages by computer before anaphora resolution can take place. The presence of clitics and strong pronouns at the same time in Pashto language complicates anaphora resolution. Replacing clitics with strong pronouns makes anaphora resolution simple and fast. In Pashto, some clitics are context free and some are context dependent. Context free ciltics can be replaced with strong pronouns using simple rules that encompass a single sentence in which the clitic itself occurs. Replacement of context dependent clitics with corresponding strong pronouns involves syntactic agreement across single or multiple clauses. In this paper, an algorithm is presented for the de-cliticization of context dependent clitics which backtracks to previous adjacent clause(s) to replace context dependent clitic with strong pronoun using syntactic constraints.

Keywords:

1 Introduction

A clitic is a morpheme that has syntactic characteristics of a word but shows evidence of being phonologically bound to another word [6]. It syntactically functions as a free morpheme but phonetically appears as a bounded morpheme. In Pashto, a word and a clitic attached to this word are pronounced as a single word [3], while in written text Clitics are often written as separate words. Syntactically, a clitic, together with the word to which it is bound, functions above the clause level. Clitics attach only phonetically to the first, last or only word in a phrase, clause or whichever part of speech the word belongs to [3].

Morphlogically, Pashto clitics are neither independent words nor affixes. They follow the host word to which they are associated. Generally, their placement in the phrase or a sentence is based on the syntactic rules of the language. Linguistically, clitics forces NP (noun phrase) reduction process, also termed as WARP (Weak Anaphoric Reduction Process) [5]. At the discourse level, Pashto clitics are used for emphasizing focus on either subject or object. Clitics occur in various positions in sentences, except in the start. Normally, a clitic occurs in the second position of the clause, i.e second position from the right of the clause [1]. Table 1 gives a complete list of clitics used in Pashto language.

Table 1. Pashto clitics

Pashto Clitics	Gloss	Type	Context Dependent
مي	mee	Pronominal	No
دي	dee	Pronominal	No
ي	***yee***	***Pronominal***	***Yes***
ام	am	Pronominal	No
مو	mo	Pronominal	No
به	ba	Modal	No
دي	de	Modal	No
خو	kho	Adverbial	No
نو	no	Adverbial	No
را	ra	Oblique Pronominal	No
د ر	**der**	**Oblique Pronominal**	**No**
ور	***wer***	**Oblique Pronominal**	***Yes***

In the de-cliticization process, a clitic is replaced with semantically equivalent strong pronoun [2]. The key advantages of the de-cliticization process are:

1. It reduces the domain of anaphoric devices in input text so that anaphora resolver would deal a smaller set of pronouns, which in turn improves the performance of anaphora resolver.
2. It helps in the translation of text into other syntactically related languages but without pronominal clitics, such as Urdu.

The replacement of a clitic with a pronoun in a clause alters the topicalization i.e. the Pragmatic function 'focus' may shift from subject to object and vice versa, which should be explicitly preserved before de-cliticization. As mentioned by Kroeger [4], focus is the essential piece of new information that is carried by a sentence. Focus is marked in all languages by intonational prominence (focal stress), but in many languages it is indicated by word order and/or special particles or clitics as in Pashto. Focus

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preservation can be done by marking the entity in a clause explicitly as topicalized, before replacing the clitic.

2 Context Dependent Clitics

A context dependent clitic refers to a previously mentioned constituent (normally, previously adjacent clause), and fills the position of a noun phrase in a clause.

Mostly, the pronominal clitic *yee* (ې), and the oblique pronominal clitics *ra* (را), *wer* (ور) and *der* (در) occur in Pashto text similar to anaphoric devices because they are syntactically linked to the subject or object of the previous clause. The replacement rules for these clitics have to take context into account. The following are the example sentences containing the clitic *ra* (را), *wer* (ور) and *der* (در), along with declicized sentences. Here, the symbol # marks clause boundaries.

Example 1a.

#کله چه سلیم ځی# نو ځه ور سره ځم#

نو	ځی	سلیم	چه	کله
[nəʊ]	[zi:]	[sʌl i:m]	[ʧeI]	[kʌlɒ]
Then	Go	Saleem		when

ځم	سره	ور	ځه
[zʌm]	[sʌrɒ]	[vʌr]	[zɒ]
Go	with	(clitic)	I

When Saleem goes, I go with him.

Example 1b (De-cliticized).

#کله چه سلیم ځی# نو ځه د هغه سره ځم#

نو	ځی	سلیم	چه	کله
[nəʊ]	[zi:]	[sʌl i:m]	[ʧeI]	[kʌlɒ]
Then	Go	Saleem		when

ځم	سره	د هغه	ځه
[zʌm]	[sʌrɒ]	[dɒghɒ]	[zɒ]
Go	with	him	I

When Saleem goes, I go with him.

Example 2a.

#کله چه سدره راځی# نو ځه ور باندے کار کوم#

نو	راځی	سدره	چه	کله
[nəʊ]	[rɒzi:]	[sIdrɒ]	[ʧeI]	[kʌlɒ]
Then	comes	Sidra		When

کوم	کار	باندے	ور	ځه
[kəʊm]	[kɒr]	[bɒndeI]	[vʌr]	[zɒ]
do	Work	on	(clitic)	I

When Sidra comes, I make (her) work.

Example 2b (De-cliticized).

#کله چه سدره راځی# نو ځه په هغي باندے کار کوم#

نو	راځی	سدره	چه	کله
[nəʊ]	[rɒzi:]	[sIdrɒ]	[ʧeI]	[kʌlɒ]
Then	comes	Sidra		When

کوم	کار	باندے	په هغي	ځه
[kəʊm]	[kɒr]	[bɒndeI]	[pɒ][ɒgheI]	[zɒ]
do	Work	On	her	I

When Sidra comes, I l make her work.

The following is the example containing clitic *der* (در).

Example 3a.

#کله چه ته راشي# نو ځه به درسره لاړشم#

نو	راشي	ته	چه	کله
[nəʊ]	[rɒʃhi:]]	[tʌ]	[ʧeI]	[kʌlɒ]
Then	come	you		when

لاړشم	سره	در	به	ځه
[lɒrʃhʌm]	[sɒrɒ]	[der]	[bɒ]	[zɒ]
will go	with	*clitic*		I

When you come, I will go with (you).

Example 3b (De-cliticized).

#کله چه ته راشي# نو ځه به **تا** سره لاړشم#

نو	راشي	ته	چه	کله
[nəʊ]	[rɒʃhi:]]	[tʌ]	[ʧeI]	[kʌlɒ]
Then	come	you		when

لاړشم	سره	**تا**	به	ځه
[lɒrʃhʌm]	[sɒrɒ]	[tɒ]	[bɒ]	[zɒ]
will go	with	*You*		I

When you come, I will go with you.

Example 4a.

#کله چه تاسو راشئ نو ځه به درسره لاړشم#

نو	راشي	تاسو	چه	کله
[nəʊ]	[rɒʃhi:]]	[tɒsəʊ]	[ʧeI]	[kʌlɒ]

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Then	come	you		when

لاړشم	سره	در	به	ځه
[lɒrʃhʌm]	[sɒrɒ]	[der]	[bɒ]	[zɒ]
will go	With	*clitic*		I

When you come, I will go with (you).

Example 4b (De-cliticized).

#کله چه تاسو راشئ# نو ځه به تاسوسره لاړشم#

نو	راشي	تاسو	چه	کله
[nəʊ]	[rɒʃhi:]]	[tɒsəʊ]	[ʧeI]	[kʌlɒ]
Then	come	you		when

لاړشم	سره	تاسو	به	ځه
[lɒrʃhʌm]	[sɒrɒ]	[tɒsəʊ]	[bɒ]	[zɒ]
will go	With	*you*		I

When you come, I will go with you.

The following is the example containing clitic rɒ (را).

Example 5a.

#کله چه ځه راشم# نوته را نه لاړشي#

نو	راشم	ځه	چه	کله
[nəʊ]	[rɒʃhʌm]	[zɒ]	[ʧeI]	[kʌlɒ]
Then	come	I		When

لاړشی	نه	را	ته
[lɒrʃhi:]	[nʌ]	[rɒ]	[tɒ]
will go	from	*clitic*	You

When I come you go away from me.

Example 5b (De-cliticized).

#کله چه ځه راشم# نوته ما نه لاړشي#

نو	راشم	ځه	چه	کله
[nəʊ]	[rɒʃhʌm]	[zɒ]	[ʧeI]	[kʌlɒ]
Then	come	I		When

لاړشی	ته	ما	ته
[lɒrʃhi:]	[nʌ]	[mɒ]	[tɒ]
will go	from	*clitic*	You

When I come you go away from me.

Example 6a.

#کله چه مونږ راشو # نوته رانه لاړشي#

نو	راشو	مونږ	چه	کله
[nəʊ]	[rɒʃhsu]	[mʊng]	[ʧeI]	[kʌlɒ]
Then	come	I		When

لاړشی	ته	را	ته
[lɒrʃhi:]	[nʌ]	[rɒ]	[tɒ]
will go	from	*clitic*	you

When we come you go away from us.

Example 6b (De-cliticized).

#کله چه مونږ راشو# نوته مونږ نه لاړشي#

نو	راشو	مونږ	چه	کله
[nəʊ]	[rɒʃhsu]	[mʊng]	[ʧeI]	[kʌlɒ]
Then	come	we		When

لاړشی	نه	مونږ	ته
[lɒrʃhi:]	[nʌ]	[mʊng]	[tɒ]
will go	from	us	you

When we come you go away from us.

The following are the example sentences containing clitic *yee* (ي).

Example 7a.

څنګه چه سدره کور ته راننوزی# مور ي په ژړا شی#

راننوزي	ته	کور	سدره	چه	څنګه
[rɒnʌnʊzi:]	[tʌ]	[kəʊr]	[sIdrɒ]	[ʧeI]	[sʌngɒ]
Enters		house	Sdra		when

شی	ژړا	په	ي	مور
[ʃhi:]	[ʤʌrɒ]	[pɒ]	[ji:]	[məʊr]
Start	cry		(clitic)	mother

As soon as Sidra enters the house, (her) mother starts weeping.

Example 7b (De-cliticized).

څنګه چه سدره کور ته راننوزي،# مور د هغي په ژړا شی#

راننوزي	ته	کور	سدره	چه	څنګه
[rɒnʌnʊzi:]	[tʌ]	[kəʊr]	[sIdrɒ]	[ʧeI]	[sʌngɒ]
Enters		house	Sdra		when

شی	ژړا	په	د هغي	مور
[ʃhi:]	[ʤʌrɒ]	[pɒ]	[dɒgeI]	[məʊr]
start	cry		(clitic)	mother

As soon as Sidra enters the house, her mother starts weeping.

Example 8a.

#کله چه سدره راغله# نو خور ي ووهله#

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نو	راغله	سدره	چه	کله
[nəʊ]	[rɒglɒ]	[sIdrɒ]	[ʧeI]	[kΛlɒ]
Then	came	Sidra		when

ووهله	ي	خور
[wɒhΛlɒ]	[ji:]	[kh̲əʊr]
Beat	(clitic)	Sister

When Sidra came, (she) beat her sister.

Example 8b (De-cliticized).

#کله چه سدره راغله# نو خور **هغي** ووهله#

نو	راغله	سدره	چه	کله
[nəʊ]	[rɒglɒ]	[sIdrɒ]	[ʧeI]	[kΛlɒ]
Then	came	Sidra		when

ووهله	هغي	خور
[wɒhΛlɒ]	[ɒgeI]	[kh̲əʊr]
Beat	(clitic)	Sister

When Sidra came, she beat her sister.

In Pashto grammer, it may seem that 1st person and 2nd person clitics are also context dependent, but they are context free. This can be explained by the following examples.

1. ځنګه چه ځه کور ته راننوزم نو مور **مي** په ژړا شی

When I enter home, my mother starts crying.

2. ځنګه چه ته کور ته راننوزي نو مور دي په ژړا شی

From the above two examples, it is evident that these clitics are not context dependent because their de-citiciazation depends upon the subject or object of the same clause in which the clitic is present, not on the previous clause(s).

How مي can be change into ما, ځما,خپل,خپله,ځه خپل,and ځه خپله is explained in Din etal [2]

The next section describes the de-cliticization of context dependent clitics in detail by a computer system.

3 De-Cliticizing Context Dependent Clitics

For the de-cliticization of Pashto text containing context dependent clitics, rule based approach is used. An algorithm is developed that takes the parsed Pashto text and transformation rules as input after describing the rules of de-clitization.

In Pashto language, the use of ې in complex sentences is context sensitive. Therefore, when removing this clitic there is a need to look at the context i.e. previous adjacent clause or phrases.

For the clitic ې in *ith* clause, the following rules apply.

1. IF *subject* of the previous *i*-1clause is *masculine* AND *subject* of *ith* clause is *null* THEN replace clitic ې with pronoun دَ هغه.
2. IF *subject* of the previous *i*-1clause is *feminine* AND *subject* of *ith* clause is *null* THEN replace clitic ې with pronoun دَ هغي.
3. IF *subject* of the previous *i*-1clause is *plural* AND *subject* of *ith* clause is *null* THEN replace clitic ې with pronoun دَ هغوئ.
4. IF *subject* of the previous *i*-1 clause is *masculine* AND *direct object* of *ith* clause is *null* THEN replace clitic ې with demonstrative pronoun هغه.
5. IF *subject* of the previous *i*-1 clause is *feminine* AND *direct object* of *ith* clause is *null* THEN replace clitic ې with demonstrative pronoun هغي.
6. IF *subject* of the previous *i*-1 clause is *plural* AND *direct object* of *ith* clause is *null* THEN replace clitic ې with demonstrative pronoun هغوئ.
7. IF *direct object* of the previous *i*-1clause is *plural* AND *subject* of *ith* clause is *null* THEN replace clitic ې with demonstrative pronoun هغوئ .

For the clitics ra (را), *wer* (ور) and *der* (در) Table-2 summarizes the replacement criteria.

Table 2: Pashto Oblique pronominal clitic's transformation table

Preconditions			***Replacement***	
Clitic	**Postposition**	**PSubject**	**Pronoun**	
ور	لاندے/سره/نه	Masculine	his	د هغه
ور	لاندے/سره/نه	Feminine	her	د هغي
ور	لاندے/سره/نه	Plural	their	د هغوئ
ور	باندے	Masculine	On him	په هغه
ور	باندے	Feminine	On her	په هغي
ور	باندے	Plural	On them	په هغوئ
ور	ته	Masculine	Him	هغه
ور	ته	Feminine	Her	هغي

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ور	ته	Plural	their	هغوئ
در	سره/نه	Singular	your	تا
در	سره/نه	Plural	yours	تاسو
را	سره/نه	Singular	me	ما
را	سره/نه	Plural	us	مونږ

The transformation rules are represented using prolog predicates for evaluation by a prototype program.

1. rule(ct(ې), rep(دَ هغه), psub(mas), sub(nill), pos(nc)).
2. rule(ct(ې), rep(دَ هغې), psub(fem), sub(nill), pos(nc)).
3. rule(ct(ې), rep(دَ هغوئ), psub(plu), sub(nill), pos(nc)).
4. rule(ct(ې), rep(هغه), psub(mas), dob(nill), pos(nc)).
5. rule(ct(ې), rep(هغې), psub(fem), dob(nill), pos(nc)).
6. rule(ct(ې), rep(هغوئ), psub(plu), dob(nill), pos(nc)).
7. rule(ct(ې), rep(هغوئ), pdob(plu), sub(nill), pos(nc)).
8. rule(ct(ور), rep(دَ هغه),postp(سره), psub(mas), pos(nc)).
9. rule(ct(ور), rep(په هغه),postp(باندے), psub(mas), pos(nc)).
10. rule(ct(ور), rep(هغې),postp(ته), psub(fem), pos(nc)).
11. rule(ct(در), rep(تا), psub(sng), postp(سره), pos(nc)).
12. rule(ct(در), rep(تاسو), psub(plu), postp(سره), pos(nc)).
13. rule(ct(را), rep(ما), psub(sg), postp(سره), pos(nc)).
14. rule(ct(را), rep(مونږ), psub(plu), postp(سره), pos(nc)).

Listing 1 Transformation Rules

The list of abbrivations, used in Listing-1, are given in Table-3. Both the rules and input text are encoded in Unicode.

Table 3: Abbreviations used in rule encoding

Abbreviation	Description
Ct	Clitic
Sub	Subject
dob	Direct Object
fem	Feminine
mas	Masculine
nc	Not change
psub	Subject in previous *i*-1 clause
pdob	Object in previous *i*-1 clause
postp	Postposition
Psubject	Previous subject
rep	Replacement
pos	Position

The algorithm takes the above rules and parsed Pashto text as input. The rest of this section gives algorithm listing, and detailed explanation of its working.

Algorithm: Clitic Replacer

```
1. Tag input text.
2. Parse input text and mark
   Syntactic entities.
3. Divide complex and compound
   sentences into clauses.
4. FOR EACH clause Ci in the text
     BEGIN
       FOR EACH clitic CTj in Ci
         CALL ReplaceCT( Ci, CTj)
     END
5. END.
```

Sub Module: ReplaceCT(C_i, CT)

```
FOR EACH Rule Rj in RuleSet
BEGIN
  IF (Rj.CT = CT) THEN
  BEGIN
    IF all conditions in Rj are true
    for Ci AND Ci-1 THEN
      Delete CT from Ci
      Place Rj.Rep at Position Rj.Pos
      RETURN
  END
END.
```

The main algorithm is responsible for reading, parsing, clause division, and detection of clitics in the text. It starts with the reading of Pashto text in Unicode. The step-1 and 2 tag and mark each word in the text for its grammatical category. In step-2 as shown in the flowchart below, the tagged text is parsed. Step-3 divides complex and compound clauses are into simple clauses. After parsing and clause division, the algorithm sets a counter variable named *i* for processing all the clauses in the text. At each iteration of the loop a test is made to find out, if the clause C_i contains a clitic C_j.

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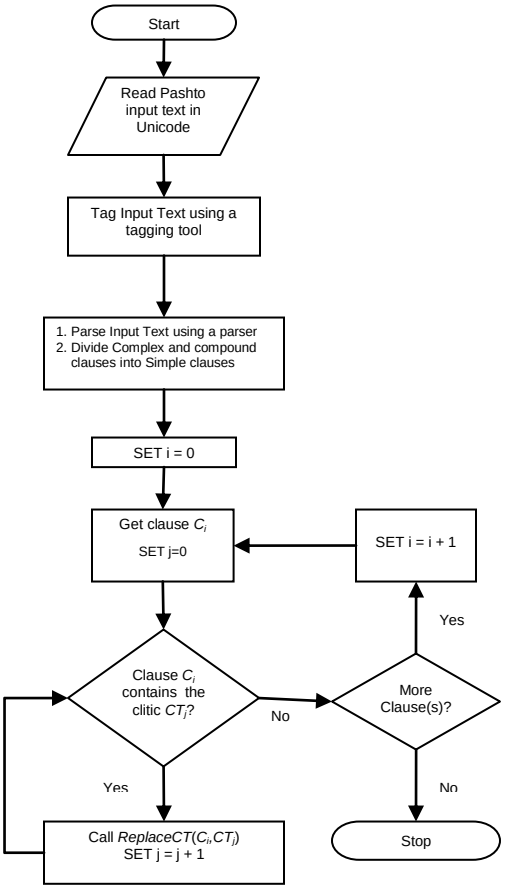

Figure 1: Flowchart of the main algorithm

Here, *j* shows the clitic number. For each clitic CT_j the algorithm calls a subprogram *ReplaceCT*(C_i, CT_j) which is responsible for replacing the clitic CT_j in clause C_i of input text. When all of the clauses have been processed, the algorithm stops.

The clitic replacement subprogram *ReplaceCT(C_i,CT)* takes two parameters, i.e a clause and a clitic. The first parameter is the C_i, which is the clause in which the clitic has to be replaced. The second parameter *CT* is the clitic which has been found in the clause C_i and needs to be replaced. At the start of the replacement process, the algorithm set a counter variable *j* to 0 for iterating through the RuleSet.

The counter variable *j* is used for indexing into a rule table (i.e table-2) designed for replacing clitics. The algorithm iterates through the rule table using *j* as index. At each *jth* row of the rule table, the clitic in at *RuleSet[j].CT* is matched with the clitic *CT* in C_i. If a match occurs the algorithm applies preconditions from *RuleSet* at *jth* row to the clause *CL*, to determine if replacement at the *jth* row of the rule table can be applied to the clause C_i.

If all the conditions are true in the *jth* row; the transformation at the *jth* row is applied to clause C_i. The clitic *CT* is replaced by a stronger pronoun given in *RuleSet[j].rep*. The subprogram *ReplaceCT* stops after the replacement of the clitic.

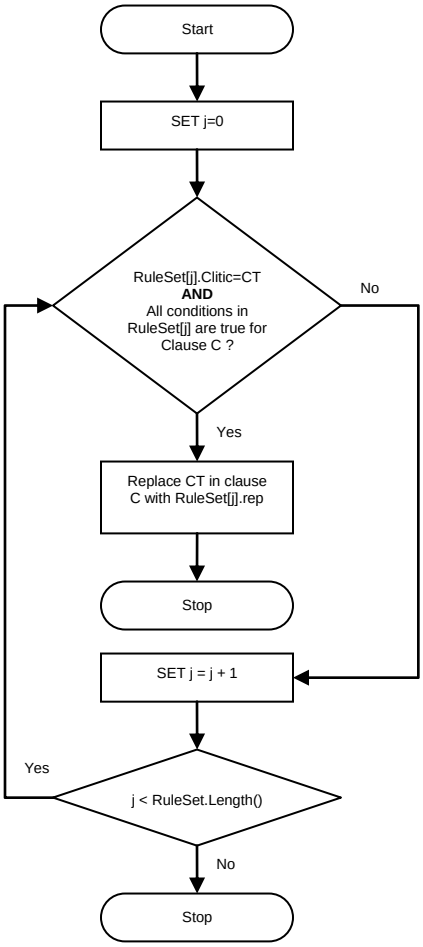

Figure 2: Flowchart of the ReplaceCT(C_i, CT)

The text data contains the parsed clauses. Table-2 of rules and table-3 of abbreviations are based on these small clauses. Some of the few tested clauses are:

1a. clause(txt(کله چه سلیم ځی نو), sub(سلیم, mas)).
1b. clause(txt(ځه ورسره ځم), ct(ور), postp(سره)).

2a. clause(txt(کله چه سدره راغله نو), sub(سدره ,fem)).
2b. clause(txt(خور ې ووهله), ct(ې), dob(), vb(ووهله, past)).

The program produces the following output for the above clauses.

1ab. کله چه سلیم ځی نو ځه د هغه سره ځم
2ab.کله چه سدره راغله نو خور هغې ووهله

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5. Evaluation and Conclusion

A prototype program was written in C++ to evaluate and test the clitic replacement algorithm and rules. The program was able to replace context dependent clitics with strong pronouns with accuracy of about 83%. The program took the parsed text in two-level Prolog predicate form. The input text for the program was tagged and parsed by, because there are no known tagging and parsing tools available for Pashto language. A set of 35 different sentences were tagged and parsed for evaluation. The text and clitics replacement rules as well as program input was encoded in Unicode format which facilitated inclusion of Pashto language tokens. The output of the program was also available to the user in Unicode format. The rules files can be modified by the user to add, remove and modify the rules.

Manual testing of the algorithm showed that the algorithm did not change the semantic structure of the input text, only focus on subject or object shifted. The declitized text was found to be suitable for anaphora resolution..

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Factors of the Project Failure

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***Abstract*—**Project failure variables and factors have been studied for many years. However, none of the study in project management literature highlighted the main variables and factors which play an important role in failure of the project. The objective of this paper is to concentrate on the project variables and factors playing an important role in the failure of any projects, using data from public and private projects by conducting Interview and Questionnaire. Similarly projects are poorly designed lacking significant aspects of planning such as objectivity, feasibility, appraisal and detail cost estimate. Monitoring and evaluation of the projects are not properly conducted, nor is any serious attention given to it during whole project life cycle. Therefore project lacked a quality management system and causes main reasons for failure. However change in project scope, design and priorities, poor utilization of management techniques, mismanaged annual plan of operation and diluted resources committed to projects cripple the situation by adversely affecting the performance. This study also finds that management needs to give attention on identifying any type of mismanagement in the project variables. Moreover, researchers studied different variables, but no such model or system has been developed which bring all such proven variables under one system of management so that managers decide easily the inclusion or exclusion of variables into a specific project environment and predicting the outcome of a project.

Keywords: Project Management, Project Failure, Factors,

1. Introduction

A Project is a unique endeavor to produce a set of deliverables with in clearly specified time, cost and quality constraints. The people usually starts project without defining and understanding the problem. They think that they are doing well and project is in progress; on other hand, when problem arise and become complicated, all the project work bogged down. The failure may not be considered as negative; it will be a positive experience if we analyze and correct the failure properly. If every thing is right in the project, there is no way to learning from the project.

Failure of project provides an opportunity for learning and to improve the decision making processes. “When one does something right only confirms what is already known and how to do it. A mistake is an indicator of a gap in one’s knowledge. Learning starts when a mistake is identified then to find out the procedure (solution) for its correctness” (Ackoff 1994). Mistake provides an opportunity for correction in the future. While in view of researcher, project may be considered failure when result does not match with their objectives.

Researchers are interested to find out the role of the project variables in failure of a project. Therefore due to its importance, the literature regarding factors which contributes into the failure of projects is presented here.

2. Related Work

According to 2001 Standish Group Study, the ratio of successful project is 16%, which is very low as compared to the failure ratio of 84%. Where, usually Project Manager is considered responsible for the success or failure of any project; therefore, majority study considered the skill of Project Manager is a major role. Majority studies suggest that many project disasters are avoidable [Heekens 2002] because most of the

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time warning signals alarm us before failure of any project.

The appropriate identification and definition of the failure factors in project life cycle will help to control project failures. Samuel et al [1990] has also studied the causes of' project failures and suggested a multidimensional justification of project failure framework, encompassing both internal efficiency and external effectiveness aspects. Moreover, they maintained that the failure or success phenomenon depends upon the parent organization that makes the judgment on the matter.

Where (see such as: Walker [1999], Cicmil [1997], Burns et al [1991], and Fiona et. al. [2001]) argue that investigations into the factors which contribute to the failures are manageable to be controlled, and their identification helps to merits their higher priority when management is concerned about new projects. They identified a set of managerially controllable factors that are associated with project failures. Their study emphasized the factors which are differed according to three contingency variables:

- The precise way in which failures were defined;
- The type of project;
- The stage of the project in its life cycle.

Havrland et al in [2001] pointed out to some of the weaknesses in project planning and design process that affect the project outcome. According to his statement any project fails to take into account the common weaknesses in project planning may meet unforeseen problems during implementation and control, which consequently results in poor performance. He drew the following weaknesses in project planning process:

- The failure to make a proper analysis of the project environment
- Lack of realism and technical feasibility.
- Over-ambitious scope of activity.
- Underestimation of time factor for completion
- Unrealistic assumption about the resources and its availability
- Management support to the project
- Insufficient examination of the institutional framework
- Unrealistic assessment of the project follow-up possibilities
- Vague project specification
- Basic conflict of objectives

Where, Soraya J. NetoAlvarez in [2003] pointed out following factors which causes for failure of any project.

- Lack of resources
- Lack of clear vision and objectives.
- Lack of Training
- Lack of user involvement
- Lack of management support
- Unable to Manage Team
- Unable to Cope with Project Size

Blaiir Witzel in [2006] focused on those factors to identify the reason of project failure:

- Lack of stakeholder involvement or support.
- Compressed or unrealistic timeliness
- Failure to adequately define
- Project is enemy of the good

From the above discussion it is clear that project variables play an important role in the success or failure of any project. Management needs to give attention to these points, where any type of mismanagement of project variables can bring failure to the projects.

3. METHODOLOGY & DATA ANALYSIS

The study was designed to identify main causes for the project failure. The methodology which was used for research is case studies, survey, interview and questionnaire from different project managers of the public and private project management institution.
Based on extensive discussion with Project Manager(s), we developed a questionnaire to find out reason for failure of projects.

The survey, contained twenty five (25) questions was conducted in different section covering End Users, Sponsor/ Senior Management, Project Directors, Project Manager, Estimation and

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Scheduling Requirements, Development Process and the Development Team.

The questionnaire is structured in three (3) sections,

3.1. Individual Information: Individual Information requires the respondents to provide their basic information so that the background of Development Planning can be explored.

3.2. Introduction: In this section the fundamental knowledge of the Management Approaches is introduced to the respondents.

3.3. Questions: There are few questions in the questionnaire which requires the respondents to select the suitable respondents.

Of the 25 question asked in questionnaire, 15 were related to those factors which can be considered as failure of a project.

4. FINDING

The result shows that no project suffered from one failure factor. All projects had multiple problems and many of the factors are co-related to each others. These finding agrees with Charette [18], Yardley [19] and Glass [20],[21] .

The most frequent factors caused in failure of the project is following:

S.No	Description	Percentage of Failure Project
1	Delay in Project Approval	75%
2	Fund not Released on Time	95%
3	Project not completed on Time	85%
4	Underestimated the Project	65%
5	Risk ignored in Project	55%
6	Lack of Staff Motivation	61%
7	Lack of Feasibility Report	53%
8	Lack of Experienced Staff	51%
9	Bad Communication between Relevant Parties	59%
10	Mismanagement of Progress	23%
11	Lack of Project Planning	49%
12	Lack of Project Monitoring	39%
13	Lack of Project Implementation	13%
14	Lack of Resources	11%
15	Lack of Quality Control	25%
16	Lack of Coordination of Resources	19%
17	Milestone not achieved	35%
18	Insufficient Measurable Output	13%
19	Over all Poor Management	17%

The research methodology approach based on Questionnaire and Interview revealed that the mechanism for project processing, approval and fund release procedures has adverse effect on the development project in the form of delayed project implementation and poor control and checking system.

Similarly projects are poorly designed lacking significant aspects of planning such as objectivity, feasibility, appraisal and detail cost estimate. Monitoring and evaluation of the projects are not properly conducted, nor is any serious attention given to it during whole project life cycle. Therefore project lacked a quality management system and causes main reasons for failure.

However change in project scope, design and priorities, poor utilization of management techniques, mismanaged annual plan of operation and diluted resources committed to projects cripple the situation by adversely affecting the performance.

5. SUMMARY & CONCLUSION:

Our results show that failure of project is not on account of a single one; they fail for multiple reasons. These findings are in full agreement with Glass [20],[21]. The objective of this paper is also to highlighted the reason for failure of any project and hidden variables/ factors for bad performance. It is also identified that the prevailing development are problem ridden and don't work well to bring about the changes as desired. Therefore, the management needs to give attention to the point that any type of mismanagement of project variables brings failure

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to the projects. In this paper these factors /issues have been discussed; however, it is pertinent to point out that although researchers did study different variables, but no such model or system has been yet developed through which all such proven variables could be brought under one system of management, to make it easy for managers to decide the inclusion or exclusion of variables into a specific project environment and predicting the outcome of that specific project.

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WiMAX Standars and Implementation challenges

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Abstract: Wireless communication systems have been in use for quite a long time. Many standards are available based on which these devices communicate, but the present standards fail to provide sufficient data rate, when the user is moving at high speed. In view of this requirement for future mobile wireless communication systems, the present standard, 802.16 has been proposed by Institute of Electrical and Electronic Engineers (IEEE). 802.16 (WiMAX) provides specifications for both fixed Line of sight (LOS) communication in the range of 10-66GHz (802.16c), and fixed, portable, Non-LOS communication in the range of 2-11GHz (802.16a, 802.16d). Also it defines wireless communication for mobiles, moving at speed of 120 KMPH, in the range of 2-6 GHz. Basically IEEE 802.16e standard is an extension to the 802.16-2004 specification and supports mobile communications. This mobility is provided through handoffs and roaming support built in to the standard. While intended to provide mobility, this technology is used by service providers to provide fixed access as well. This specification operates in the 2.3 and 2.5 GHz frequency bands. In this article we provide an overview of the fixed and mobile WiMAX technology and its development. We focus our discussion on QoS provisioning and mobile WiMAX specification. The associated WiMAX implementation challenges are outlined. The paper then compares mobile WiMAX with other standards. The physical layer implementation of the 802.16d standard is also proposed.

Keywords: WiMAX, Handoff, WLAN, WMAN, 3rd generation, LTE etc.

1. Introduction

Worldwide interoperability for microwave access (WiMAX) air interface specifications are based on the IEEE 802.16-2004 standard and the IEEE 802.16e amendment, ratified in late 2004 and 2005, respectively. Mobile WiMAX is a wireless standard which introduces orthogonal frequency division multiple access (OFDMA) and other key features to enable mobile broadband services at a speed up to 120 km/h. The IEEE 802.16 standard for BWA and its associated industry consortium, WiMAX forum has emerged in 2004. The WiMAX Forum, a nonprofit organization of 414 member companies, was formed to trim down these specifications to a manageable size and ensure interoperability of equipment among different vendors through its certification process. In addition, the WiMAX Forum Network Working Group is developing the higher-level networking specifications that are not covered in the IEEE 802.16 standards. These combined efforts will help to define the end-to-end system specifications for the Mobile WiMAX standard. WiMAX is Wireless MAN which competes with wireless local area networks (WLANs) and the third generation (3G) wireless standards on coverage and data rate. More specifically, WiMAX supports a much larger coverage area than WLAN, as it does not require line of sight for a connection, and is significantly less costly compared to the current 3G cellular standards. The WiMAX standard supports both fixed and mobile broadband data services. Wireless broadband data communication is experiencing a rapid expansion. Broadband Wireless Access (BWA) has emerged as a promising solution for last mile access technology to provide high speed internet access in the residential as well as small and medium sized enterprise sectors. At this moment, cable and digital subscriber line (DSL) technologies are providing broadband service in this sectors. But the practical difficulties in deployment have prevented them from reaching many potential broadband internet customers. Many areas throughout the world currently are not under broadband access facilities. On the other side many older cable networks do not have return channel which will prevent to offer internet access and many commercial areas are often not covered by cable network. But with BWA this difficulties can be overcome. Because of its wireless nature it can be faster to deploy, easier to scale and more flexible, thereby giving it the potential to serve customers not served or not satisfied by their wired broadband alternatives. IEEE 802.16 standard promise to offer high data rate over large areas to a large number of users where broadband is unavailable. In addition to this it can be used for fixed wireless access with substantially higher bandwidth than most cellular networks. Wireless broadband systems have been in use for many years, but the development of this standard enables economy of scale that can bring down

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the cost of equipment and ensure interoperability. The first version of the IEEE 802.16 standard operates in the 10–66GHz frequency band and requires line of sight Propagation. Later the standard extended its operation to 2-11 GHz frequency band enabling non line of sight (NLOS) propagation, which requires techniques that efficiently mitigate the impairment of fading and multipath. Taking the advantage of OFDM technique, it is possible to provide robust broadband service in hostile wireless channel. The objective of the Mobile WiMAX standard is to fill the gap between the WLANs (which provide very high data rate but short-range coverage) and the 3G cellular systems (which provide highly mobile long-range coverage but low data rate) by providing a specification that supports a mobile broadband access system [including functions to enable handoff between base stations. Furthermore, the target is to greatly reduce the cost of WiMAX infrastructure per unit data rate by significantly increasing the system capacity compared to the current 3G standard systems.

2. WiMAX Standards

The Mobile WiMAX specifications basically consist of the specifications for the fixed system (IEEE 802.16-2004 Air Interface standard), the specifications for the mobile system (IEEE 802.16e amendment), and the specifications for the higher-layer networking from the WiMAX Forum. The first two define specifications for the PHY layer (such as the frame structure, FDMA, modulation, and coding) and the MAC layer (such as the data and control plane and the sleep mode for the terminals). The higher-layer networking specifications include the reference network architecture and specify how wide-area roaming and handoff protocol are being addressed.

2.1 Standard 802.16-2004

This standard is the formal one being used for current fixed and nomadic Line of Sight (LOS) and Non Line of Sight (NLOS) WiMAX implementations and is based on and backwardly compatible with 802.16 and 802.16a . The WiMAX Forum profiles supporting 802.16 2004 are in the 3.5 GHz and 5.8 GHz frequency bands. This standard will be used for cell creation in non-mobile scenarios and LOS distance links.

2.2 Standard 802.16e

This standard is an extension to the 802.16-2004 specification and supports mobile communications. This mobility is provided through handoffs and roaming support built in to the standard. While intended to provide mobility, this technology is used by service providers to provide fixed access as well. This specification operates in the 2.3 and 2.5 GHz frequency bands.

3. Target Applications

Major application areas for the Mobile WiMAX standard are:

1. Voice over Internet protocol (VoIP),
2. Video conferencing,
3. Streaming media, multiplayer interactive gaming,
4. Web browsing, instant messaging, and media content downloading etc.

The Mobile WiMAX standard has following features which make it a good choice in current scenario:

1. A very high capacity and high bandwidth capable of catering to both real time and data traffic.
2. A flexible architecture to ease deployment.
3. Wide area mobility and worldwide coverage.
4. Quality of service (QoS) to prioritize and optimize traffic,
5. Interoperability of equipment.

Systems using the WiMAX standard can provide ubiquitous mobile services. A user may be using a wireless videophone, a laptop, or a PDA for data services and may also be performing video streaming or uploading photos from a wireless digital camera. The user could be video conferencing on the run (for instance, at the airport or on a train), connected to a private or public network, from home to office and anywhere around the globe. In the area of public safety, a fire team could download the internal maps of a building on fire while the rescue vehicles are still on the road and could transmit real-time information on a patient before the ambulance even reaches the hospital. Similarly, a teaching institution could provide cost effective distance education to students inside and outside the campus with different levels of service in voice, data, and video provided for by the WiMAX built-in QoS. For operators keen to capture a slice of the underserved mobile broadband market, WiMAX offers a network architecture that is highly scalable, low in cost, and easy to deploy in a licensed or licensed-exempt spectrum.

4. Architecture

Mobile WiMAX defines an all-Internet protocol (IP) end-to-end network architecture, which is an integrated telecommunications network architecture that uses IP for the end-to-end transport of all user data and signaling data. Core networks based on IP routers and switches are easily scalable and easier to install and operate than a circuit switched network. The superior system capacity performance of Mobile WiMAX is made possible by the

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combination of OFDMA and advanced antenna technologies, adaptive modulation and coding techniques, and fine granularity quality of service.

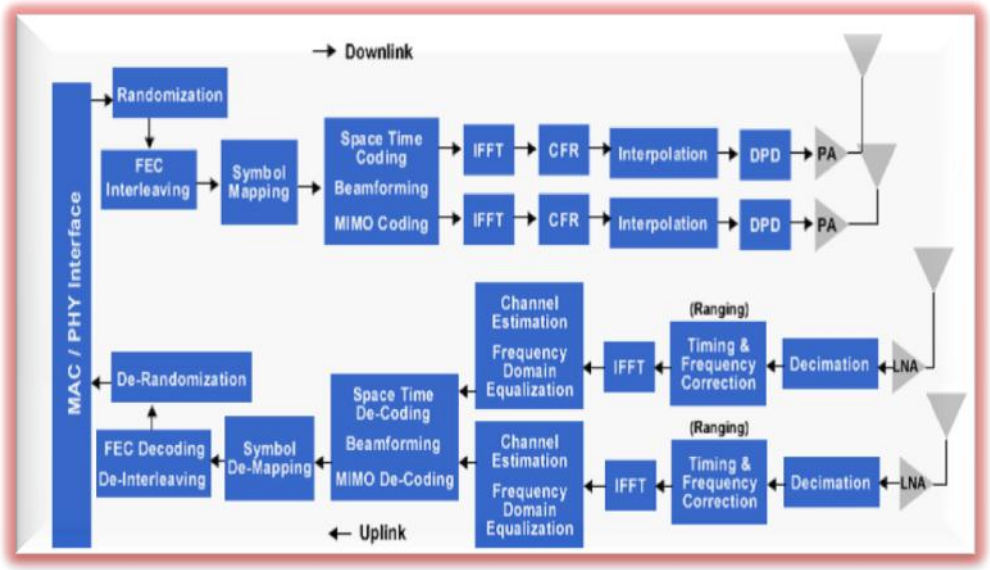

Figure 1: Block diagram a typical WiMAX system.

OFDMA is an extended, multi-user orthogonal frequency division multiplexing (OFDM) that can accommodate many users at the same time on the same channel. This technique has also been adopted by Mobile WiMAX where multiplexing of sets of OFDM subcarriers within the same channel is provided to data streams from multiple users. OFDMA has been used because it provides tolerance to multipath, frequency-selective fading, scalable channel bandwidth, and high compatibility with advanced antenna technology. Tolerance to multipath in OFDMA is accomplished because OFDM is an efficient technique to resolve the multipath delay spread that often occurs in a non line-of-sight wireless channel. OFDM subdivides the bandwidth of a signal into a number of orthogonal frequency subcarriers. By doing so, an input data stream is branched into several data paths with lower data rate, thus increasing the symbol duration and thereby reducing the relative multipath delay spread. By introducing a guard time that is greater than the delay spread for each OFDM symbol, the inter-symbol interference due to delay spread can be almost eliminated. Impact of frequency-selective fading is minimized in OFDMA simply by selecting the right subcarriers for each user. Bandwidth scalability can be made possible by proportionate adjustment of the Fast Fourier transform (FFT) size to the channel bandwidth with fixed sub carrier frequency spacing and symbol duration, thereby incurring minimum additional implementation complexity and simultaneously maintaining transparency to the higher layers. Therefore, Mobile WiMAX can deliver worldwide interoperability as it adjusts its bandwidth to adapt to the spectrum allocation in different countries and regions and to a wide variety of traffic loading requirements. Currently Mobile WiMAX supports space time coding (STC), spatial multiplexing (SM), and smart antenna beam-forming, which are some of the most powerful techniques to significantly improve spectral efficiency and system capacity. OFDMA and advanced antenna technology will help further boost Mobile WiMAX spectral efficiency, coverage, and system capacity. In addition, OFDMA plus the very high system capacity and flexible mechanism of optimal scheduling of space, frequency, and time resources on a frame-by-frame basis enables better enforcement of QoS. As a result, Mobile WiMAX systems can support a wide range of services, such as voice and video with vastly different QoS requirements.

5. Hardware Platform for WiMAX Implementation

Designers of WiMAX systems need to meet a number of critical requirements such as processing speed, flexibility and time-to-market, and it is these stringent requirements that ultimately drive the choice of the hardware platform. Some of the major challenges are further described below.

5.1. Implementation Challenges

Processing speed: Broadband wireless systems such as WiMAX have throughput and data rate requirements that are significantly higher than those in cellular systems. In

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order to be able to support high data rates of WiMAX system, the underlying hardware platform must have significant processing capabilities. In addition, several advanced signal processing techniques such as Turbo coding/decoding, and front end functions such as FFT/IFFT, beam-forming, MIMO, CFR and DPD are very computationally intensive and require several billion multiply and accumulate (MAC) operations per second.

Flexibility: WiMAX is a relatively new market and is currently going through the initial development and deployment process. So under this current scenario, having hardware flexibility/reprogrammability in the end WiMAX compliant product is very important. This ensures that in-field programmability is possible, alleviating the risks posed by constantly evolving standards.

Time to Market: Because WiMAX is an emerging technology, time-to-market is a key differentiator for OEMs looking for early success in gaining market share. This has a direct effect on the development cycle and choice of hardware platform, with designers requiring easy-to-use development tools, software, boards, and off-the-shelf IP and reference designs in order to accelerate the system design.

Cost Reduction Path: Another important requirement to keep in mind while choosing the hardware platform is the availability of a long term cost reduction path. The evolving WiMAX Standard/market is expected to stabilize after the initial uncertainty surrounding it, leading to a situation where cost of the final product becomes much more important than retaining flexibility. A hardware platform that has such a clear cost reduction path and enables a seamless flexibility/cost tradeoff is the need of the hour.

6. Comparison With Other Standards

WLAN standards such as IEEE 802.11a and IEEE 802.11g provide user throughput of 1 Mb/s or more, and allow broadband access to the Internet within a cell radius of a couple of hundred meters. On the other hand, current 3G cellular networks, which are optimized for voice, provide paging and low-data-rate services within a very large area. As stated earlier, Mobile WiMAX is a metropolitan access technique that was developed to provide not only broadband wireless access but also larger area coverage. Both WLAN and Mobile WiMAX provide high data rate services but with quite different area of coverage; therefore, they complement each other. However, in the long run, the existing 3G networks may be threatened by the emergence of a successful Mobile WiMAX. To respond to this threat, another competing standard 3GPP long-term evolution (LTE)—is currently being developed to include among others advanced antenna technology, OFDMA, and flexible transmission bandwidth. In short, 3GPP LTE and Mobile WiMAX share many common technologies and architectures, but also exhibit differences. The SC-FDMA signal carries a lower peak-to-average power ratio and hence has better power efficiency for the subscriber units compared to OFDMA (as used in the Mobile WiMAX standard). 3GPP LTE targets a 100 Mbps downlink and 50 Mbps uplink peak data rate throughput at 20 MHz channel bandwidth. Peak data rate throughput implies that the mobile resides near the BS and operates at its peak performance. Although 3GPP LTE is expected to compete against Mobile WiMAX, the 3GPP LTE system is not expected to become commercial before 2010.

7. Results and Discussions:

The WiMAX simulink models on simulation display the spectrum plots of the transmitted signal per antenna, two antenna and a scatter plot of the received signal in figure 2,3 and 4. We can use the spectrum plots to verify the channel bandwidth in use and the subcarrier spacing. We can use the scatter plots to gauge which modulation type is in use, as the plot resembles a signal constellation of 2, 4, 16, or 64 points under good channel conditions.

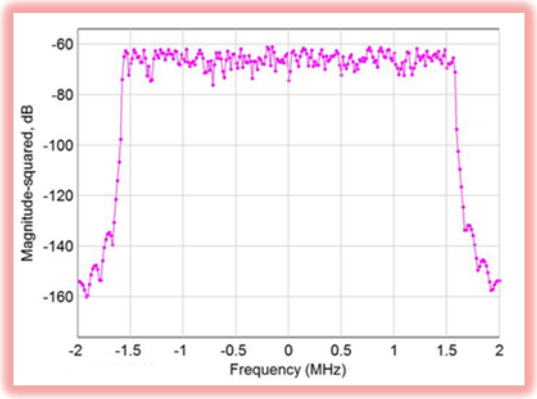

Figure 2: WiMAX (802.16d) transmitter spectrum

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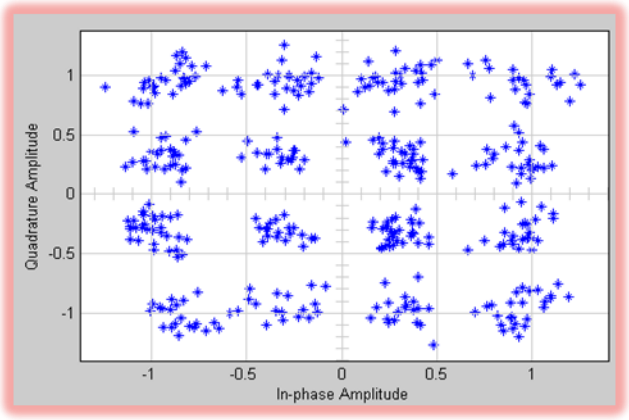

Figure 3: WiMAX Transmitter two Antenna spectrum

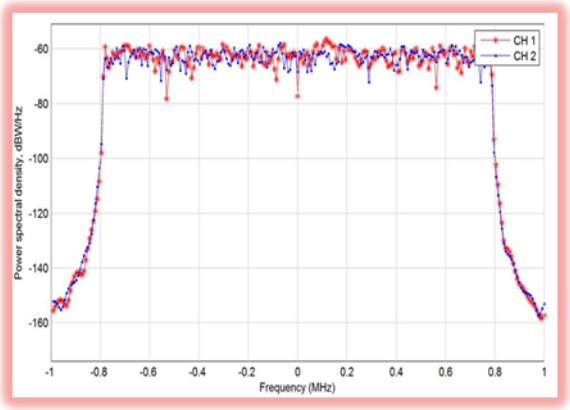

Figure 4: WiMAX (802.16d) receiver constellation

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8. Conclusions

WiMAX provides specifications for both fixed Line of sight (LOS) communication in the range of 10-66GHz (802.16c), and fixed, portable, Non-LOS communication in the range of 2-11GHz (802.16a & 802.16d). Support for both time division duplex (TDD) and frequency division duplex (FDD) SS can be provided, both using a burst transmission format whose framing mechanism supports adaptive burst profiling in which transmission parameters, including the modulation and coding schemes, may be adjusted individually ,thus providing high data rates. WiMAX employs orthogonal frequency division multiplexing (OFDM) technology, making it efficiently coped with Inter-Symbol Interference (ISI) and Inter-Channel Interference (ICI) by multipath, as well as with high spectrum utilization. Therefore, its development will become faster and faster. In addition to this major challenges in the implementation of WiMAX are summarized. By comparing WiMAX with other standards it is found that in current scenario it is competing well with the best mobile technologies.

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